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Part I.

Original Contributions.

ON THE TREATMENT OF SYMPATHETIC OPHTHALMIA.

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Few subjects have, in these latter days, attracted more attention, or excited more painful interest amongst ophthalmic surgeons than sympathetic ophthalmia; nor have we far to seek in explanation of this very natural feeling, for, in the presence of this dread disease, our art is but too often impotent and ineffectual. Athough there exists a sad uniformity of opinion as to the intractable nature of the malady, and as to the frequency, and well-nigh constancy, with which it either seriously impairs, or absolutely destroys the sight; and although there is a recognized train of well-marked symptoms common to all these cases, in which certain structures are specially invaded, and undergo a clearly marked metamorphosis, the latter differing in its character from all other results of inflammatory action, there yet remains something to be said as to the nature and extent

of the injury which may give rise to sympathetic ophthalmia, the period at which the disease usually exhausts itself, the structures which it involves, and, finally, as to the best method of treatment to be adopted for its amelioration. The disease is, however, one which demands, and can alone be compassed by, the united vigilance and observation of all those who have had experience of its history, and we can only obtain a complete and exhaustive literature of this difficult subject in all its various aspects if each ophthalmologist who has had some special experience, founded on cases under his own immediate observation, will place his facts on record, and thus enable us gradually to acquire a complete and accurate knowledge of the disease. Influenced by these considerations, I propose, in the latter portion of this paper, to quote briefly a few cases that have come under my notice, and that seem to have a practical bearing upon sympathetic ophthalmia; and, in so doing, I follow the good example set by my esteemed friend Mr. George Lawson, who contributed a valuable paper on this subject in the last issue of the Reports, and more recently by Dr. David Webster, of New York, who related some very interesting experiences in this disease before the American Ophthalmological Society.

Regarding the nature and extent of the injury which may be the exciting cause of this disease, whilst it may be admitted that the presence of a foreign body in the eye is a frequent factor, and must be regarded as a permanent source of danger, we not infrequently find that simple wounds are sufficient to induce this terrible malady: and although wounds which invade the ciliary region are certainly the most dangerous, yet cases have come under my observation in which injuries, and even simple incisions of the cornea, have produced the same result. Mr. Brudenell Carter, in his work on Diseases of the Eye, quotes examples of this, and there are doubtless few ophthalmic surgeons of large experience who have not had cases, though fortunately such are of rare occurrence, in which an ordinary corneal

operation for cataract that gave early promise of success, has been followed by total eclipse of both eyes. I may here venture to express my individual opinion, that, whilst the nature of the injury exerts, as a rule, a very powerful influence upon the initiation of sympathetic ophthalmia, yet the fact that injuries of all descriptions frequently occur without being followed by this result, and the extreme rarity with which our operations give rise to it seem to prove that a peculiar and exceptional condition of the nervous system is a powerful agent in these cases. Further experience and investigation in this direction may, I venture to hope, afford valuable aid in diagnosing the constitutional soil in which this terrible weed is likely to grow. As to the period occupied in the development of the disease, I have usually found that it has run its active course, and completed its morbid changes, in from twelve to eighteen months; and it may thus be said to have a marked and finite limit.

When this has been reached, the affected organ may, and not infrequently does, remain unchanged for an indefinite period, showing no tendency either to improvement or deterioration. The symptoms and pathological changes which characterize this disease have been so fully described in well-known works, that I merely call attention to them in order to insist on a practical point, which, though sometimes overlooked, is of great value, namely: that, although we have in every instance a complete transformation of the iris, lens, and capsule into a tough, opaque, and inelastic tissue, yet, as a rule, the fundus of the eye is but slightly involved. As regards the general principles of treatment, it will at once be conceded that, in cases of direct injury, those in charge are relieved of all responsibility when the wound is of so severe a nature as to necessitate the immediate removal of the eye. There are cases, however, of comparatively slight injury, where excellent, if not absolutely normal vision is retained in the wounded organ, so that the question of enucleation can hardly be suggested, and would certainly not be entertained either by patient, parents, or friends; and yet

when, from the character and situation of the wound, the possible and not improbable occurrence of sympathetic ophthalmia rises like a spectre before the mind of the oculist. The correct and obvious course to pursue is to keep such cases under close observation, so that active measures may at once be adopted on the first approach of danger. If the damaged globe be removed before any organic mischief has commenced in its companion all will be well; but if disease be once sympathetically established, even in a slight degree, enucleation of the injured eye entirely fails to arrest the trouble, and more than one case has come under my observation where some useful sight has ultimately been retained in the wounded globe when that which was secondarily involved has become absolutely blind.

As to the treatment of the disease during its progress, I have never been able to satisfy my mind that we possess any means of exerting a specifically beneficial influence, either by local or constitutional remedies. We may endeavour in the very early stages to counteract the tendency to contraction of the pupil by the use of atropine, or our yet more powerful ally duboisine; but the rapid metamorphosis undergone by the iris soon renders these remedies useless and inert; whilst a too long continuation of them may do positive harm. Light should be carefully excluded, and the constitutional power of the patient maintained, but not stimulated. In these simple rules may be comprised all that our art can at present accomplish. Any operative interference during the progress of the disease is, in my opinion, contra-indicated. Every attempt that I have made, or have seen others make, in this direction has been followed by aggravation of the symptoms. It is only when the disease has run its course, and finished its work of destruction, so that the eye has not only become perfectly quiet, losing all vascularity and sensitiveness to light, but when this condition of quiescence has existed for some time, that it may become expedient to commence operative measures. In illustration of this part of my subject, and in explanation of my treatment at this

final stage, I cannot perhaps do better than quote the following cases which have recently occurred in my practice :—

The first case is that of Henry L., aged twenty-two. When ten years old he wounded his right eye with a packing needle, penetrating the ciliary region deeply and destroying the sight. Some months later, he came under my care at the Moorfields Hospital, with sympathetic inflammation of the left eye. The right eye was removed, but the disease progressed in the other, and the boy became blind. I declined to operate then, but expressed a desire to see him at a later period. He was admitted into a Blind School, and for nine years he was educated as a blind boy. At the end of that time, in December, 1877, he came to me at the Middlesex Hospital. I found the tension normal, the anterior chamber good, the iris and capsule presenting the appearance usual in these cases. There was faint perception of vivid colours but no definition of objects. The patient was admitted into the hospital, and, after he had been placed under the influence of an anæsthetic, I proceeded to perform the first operation in the following manner. Using a speculum, and fixing the globe, I introduced a fine needle through the cornea, and directed the point to the centre of the opaque capsule. This proved so tough that the point of the needle would not penetrate, and I found, that if I continued to thrust on the point, I pushed the capsule back, with a risk of dragging on the ciliary region, or separating the iris from its ciliary attachment. I therefore kept the point gently pressed on the surface of the capsule, and by making a rapid rotatory movement, on the principle of the gimblet, I succeeded in partially penetrating, and entangling the point in, the substance of the capsule. I then introduced a second needle from the opposite side, and by bringing the penetrating force of one needle to bear upon the other, I pierced the tough capsule with both : then, by separating one point from the other, I succeeded in making a rent in the centre. This was followed by the escape of a small quantity of lens matter, of the consistence of cream cheese. The

operation gave rise to very slight reaction, and an interval of two months was allowed to elapse during which the soft lens matter was absorbed, and the capsule closed again. The same operation was repeated with greater facility and with the same results; more soft lens matter escaped, but to a less amount; this again was gradually absorbed, and in the course of about two months the capsule closed once more. For a third time the same operation with two needles was performed, and, on this occasion, I was rewarded for my perseverance by obtaining a small round clear space, through which rays of light could penetrate to the retina, so that, after an interval of a few months, with a + $3\frac{1}{2}$-inch lens he saw $\frac{10}{80}$ and with a + $2\frac{1}{2}$-inch could read Jaeger No. 2. The patient has gone to America, having accepted a situation there as a church organist; but before he left in August last he was seen, and his vision tested, by Dr. Warlomont, of Brussels, who was in London at that time. Practice had improved the sight, and with the glasses for reading he could decipher a few words of Jaeger 1.

The second case is that of a child, Master Stanley D., aged eight, from Valentia, in Ireland; he met with an injury to his right eye, about five years ago, by running against the latch of a door. He was seen by Dr. Swanzy, of Dublin, who suggested enucleation, but, owing to the anxiety of the parents to save the eye, the operation was not performed. The child was taken home, and, at the expiration of three weeks, the left eye became sympathetically affected. Five weeks after the injury, the right eye was removed by Dr. Macnaughton Jones, of Cork; but the sympathetic inflammation progressed in the left eye till there was only perception of shadows. When I saw the child in April, 1880, more than four years after the injury, the left eye presented the usual appearances observable in these cases, and was in all respects similar to the one already quoted. I operated on May 19th, pursuing exactly the same plan with two needles that I have described above, and in this instance also lens matter was released from between the layers of the tough capsule.

The eye bore the operation well, but the pupil gradually reclosed, and a final needle operation on August 16th, accomplished the desired end, namely: a clear round central pupil through which the child, with a + 4-inch lens saw $\frac{10}{70}$. He had not been taught to read, but, with a + $2\frac{1}{2}$-inch lens, he distinguished the second-hand on a watch.

Some years ago I read a paper on sympathetic ophthalmia, at the Heidelberg Congress, in which I quoted somewhat similar cases, and advocated a similar method of operating; and all my subsequent experience has confirmed the soundness of the views I then put forth. On the other hand, where I have seen iridectomy, iridotomy, and extraction attempted, the result has been disappointing. As I am decidedly of opinion that the successful issue of the cases which I have cited was largely, if not entirely, due to the special method of operative procedure which I adopted, I have brought this subject forward again in the hope that my experience may prove useful to the profession.

A SUMMARY OF CASES OF OCULAR PALSY, WITH COMMENTS.

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The interest excited by two papers on ocular palsies, recently communicated by Mr. J. Hutchinson to the Royal Medical and Chirurgical Society,* has induced me to offer to the readers of these reports a summary of 127 cases occurring in my hospital and private practice.

Of this total eighty-four are instances of palsies of extra-ocular muscles only, nineteen are examples of palsies of intra-ocular muscles alone, whilst in the remainder, twenty-four, the extra- and intra-ocular muscles were simultaneously implicated.

Group I.—*Palsies of Extra-Ocular Muscles supplied by the Third Cranial Nerve.*

Since this nerve supplies several muscles, and many orbital palsies have a peripheral origin, it might be inferred that its palsies would be much more frequent than those of the fourth and sixth nerves distributed as these are each to one muscle only.

As regards the fourth nerve this inference is borne out by facts, but it is not so with respect to the sixth nerve, for palsy of the Rectus externus is (as, I think, was remarked by the late A. v. Gräfe) of singularly frequent occurrence.

An analysis of nineteen cases of palsy of those extra-ocular muscles, only which are innervated by the third nerve, (all other ocular muscles escaping), shows that in five of these

* Med. Chir. Trans., vol. lxi, p. 216, and vol. lxii, p. 307.

the Rectus superior alone was implicated; in three the Rectus inferior alone; in two the Rectus internus only; in one the Obliquus inferior. In the remainder eight more than one muscle, and in a few all the third nerve muscles were palsied.

As regards their origin in a very small number of cases, violence was the immediate and sole cause—as in the following instance where all the third nerve muscles on both sides except the Levatores palpebrarum were palsied.

Case 1.—A sail-maker, æt. 31 years, a spare, wiry man, in good health, fell from the ship's top-mast into the rigging, and thence on to the deck. His shipmates took him up stunned, and placed him in his berth, where he lay unconscious during several hours. On regaining consciousness he found his sight very confused, and those about him saw that his eyes were "turned."

Thirteen months after this accident, on his ship coming into port, he was brought the same day to the Royal London Ophthalmic Hospital on the 4th February, 1864. Both eyes were seen to be directed strongly outwards, the temporal border of each cornea being not more than 2mm. distant from the outer commissure of the eyelids, and by no effort could they be inverted. A strong effort to look up caused a very slight upward movement of the cornea, and the effort to look down produced an equally limited movement of the cornea downwards, jerky, and with slight rotations.

The pupils were equal; in moderately bright daylight their estimated diameter was 2·5mm. to 3mm., which under exposure to full light became about 2mm. With the left eye he read No. 8, and with the right eye No. 10 in Jäger's scale.

The left optic papilla had a pale bluish colour, the details of its lamina cribrosa were unnaturally distinct from the centre outwards nearly to the edge, and the arteria centralis was unduly small. The right optic papilla was congested.

Here the simultaneous implication of both three nerves pointed to an intracranial, and I suggest, a central cause. Assuming the correctness of this, what is the explanation of the escape of the nerve twigs to the Levat. palp. and to the intra-ocular muscles? It may be found, I think, in the experi-

ments of Hansen and Voelckers undertaken to determine the origin of the accommodation nerves.* These careful investigators discovered that in the dog the roots of the third nerve are a series of separate bundles of fibres, by stimulating each of which in turn from before backwards, movements first of accommodation, next of the iris, and then of the Rect. sup., Levator palp., Rect. int., Rect. inf. and Obliq. inf., could be provoked in the sequence here given. It is, I think, easier to conceive that the injury might have occasioned a laceration of cerebral tissue, or hæmorrhage implicating some, and sparing other roots in a situation where these are separate, than after their combination in the nerve, and after it leaves the surface of the crus.

Case 2.—A young tailoress, in withdrawing her head from an open window, struck her crown against the sash-bar. The blow was so severe that it stunned her for a few moments, and made her head ache much. Within an hour of the accident her left upper eyelid had fallen so much as to cover the pupil, which for a short time made her suppose the eye was blinded.

Three weeks after this, when I first saw her at the Royal London Ophthalmic Hospital, on 29th March, 1865, complete palsy of the Levator palp. sup., Rect. int., sup., inf., and of the Obliq. inf. was noted.

Here the palsy followed so quickly upon the injury that the causal relation of the latter was highly probable. Antecedent intracranial disease could not, however, be confidently excluded for the patient spoke of having had frequent headaches, and a neighbour hinted that she had been occasionally light-headed. There was, however, some doubt whether this was not from alcohol taken to drown care, for her circumstances were truly wretched. She and her husband were both out of work, and they were evidently insufficiently fed and clothed.

Once pregnant she had miscarried, and had ever since had profuse leucorrhœa.

Of five patients who had palsy of the Rect. sup. only, one (3rd case) was a lad of 14 years, who was brought to the Royal London Ophthalmic Hospital on 28th November 1874, at which time the diplopia was said to have existed for

* Arch. fur Ophth., Bd. 24 Abth. 1, s. 1. u.f.

about one year. It was limited still to the upper part of the visual field. When he looked up the right cornea plainly lagged below the left. No cause was discoverable, he appeared to be healthy, and had not, he said had any accident or illness. In the absence of any positive indication, nux vomica and iron were prescribed. Contrary to expectation, at the end of a month the palsy had greatly diminished.

The case just narrated is remarkable for the rapid improvement under treatment, and for the absence of contracture of the antagonist of the palsied muscle at the end of so long a time as one year.

In the following case contracture of the antagonist muscle was already present at a much earlier time.

Case 4.—A smith, æt. 38, a tall, spare, muscular fellow, after sitting in a full draught at an open window in a paroxysm of asthma, saw double. A few days after this, when he came first under my care at the Royal London Ophthalmic Hospital, he was found to have vertical diplopia with the greatest separation of the images at the uppermost limit of the field, but beginning below the level of the eyes. The left cornea lagged below the right when he looked up. He kept the left eye covered, having found that this took away the double-sight and the dizziness.

He had had, he said, a similar attack five years previously, in which he was blind for several days. As no trace of any former disorder was discoverable in the fundus oculi it was thought probable that the blindness was not due to disease of retina or optic nerve, but was merely caused by complete ptosis of the upper eyelid.

Of the three remaining cases of palsy of the Rect. sup. only, one patient was a middle-aged labourer, another a dyspeptic clerk, and the third a lady, æt. 33, who had probably acquired syphilis.

Case 5.—A well-digger who, with the exception of an ague seven or eight years previously, had enjoyed good health, came to the Royal London Ophthalmic Hospital on 12th July, 1867, for advice about a confusion of sight, which puzzled him so much that he could not work. It was plainly diplopia due to palsy of the Rect. sup. of the left eye.

He attributed his disorder, and probably correctly, to a severe cold in his forehead, with browache which came on after working during several hours in a cold well with his cap wet through with dripping water.

Case 6.—A very emotional little brunette, æt. 33, was brought to me by her family medicus in January, 1877, suffering from confused sight, dizziness, and a fixed uneasiness in the crown of her head which made her very apprehensive of brain disease. The visual trouble was diplopia in the upper half of the field due to incomplete palsy of the Rect. sup.

Her husband had had syphilis, and although whilst under the care of her present medical attendant, she had not herself evidenced any manifestation of this taint, there were circumstances in her earlier history, after marriage, which made infection not improbable.

She improved under the use of iodide of potassium.

In the following cases two muscles associated in the concerted movement of eyeball and eyelid in looking upwards were simultaneously palsied: one the Levator palp. sup. and Rect. sup.; in the other the Levator palp. sup. and Obliq. inf.

Case 7.— ——, æt. 33, a healthy-looking woman, came under my treatment at the Royal London Ophthalmic Hospital on 27th April, 1869, for double-sight in the upper half of the field at the extreme upper limit of which occurred the greatest separation of the two images.

The left cornea was manifestly lower than the right. There was also ptosis of the left upper eyelid.

Six years previously she had had, she said, an attack of double-sight obliging her to turn her head towards her left shoulder. This passed off, and sixteen months ago her left upper eyelid began to droop and in looking towards her right objects seemed doubled. At that time she had much pain in the back of the head. This attack also passed off, and she remained free from ocular trouble until shortly before her present illness.

Case 8.— ——, æt. 33, consulted me on 13th September, 1872, for diplopia which had come on suddenly a few days previously in the course of convalescence from a severe gastric disorder

which the family medicus called "*Liver.*" He had had a similar confusion of sight in 1870.

Of the three patients with palsy of the Rect. inf. only, one was presumably tainted with syphilis, and another was rheumatic.

Case 9.—On 30th June, 1865, I saw in consultation a middle-aged lady for double-sight in the lower half of the visual field. She plainly had incomplete palsy of the Rect. inf. of the right eye. She had had a similar attack three years previously lasting three months, and disappearing under the use of iodide of potassium. A long illness, after marriage, was probably, from its symptoms, syphilis.

Case 10.— ——, æt. 43, dyspeptic and very rheumatic, came under my care at the Royal London Ophthalmic Hospital, 23rd February, 1863, for diplopia in the lower half of the visual field which was plainly due to paresis of the Rect. inf. of the right eye. It had lasted one month. Syphilis was denied, and a careful inquiry failed to detect any evidence of this taint.

In the two next cases palsy of the Rect. int. was presumably due to a central disorder, in the first perhaps a gumma, in the second senile softening.

Case 11.— ——, æt. 26, had a chancre in the autumn of 1865, followed by secondaries. In November, 1867, he was under treatment for iritis, and on 12th September, 1871, he again came to the Royal London Ophthalmic Hospital, now with confusion of sight which hindered him from working.

He had incomplete palsy of both Rect. int., both eyes diverged, and the vertical corneal meridian could not be brought inwards to the middle of the palpebral fissure. He had also at this time double sarcocele and condylomata around the anus.

Case 12.—A housekeeper, æt. 64, came to my polyclinic at the Middlesex Hospital on 13th January, 1872, complaining of double sight, which she had first noticed a fortnight previously. It was found to be due to incomplete palsy of the Rect. int. of the right eye. By May this had quite disappeared. In

the following December she returned, having now much pain in the left temple and deafness of both ears. She soon after died with symptoms of cerebral hæmorrhage.

In this case the ocular palsy occurred late in the course of locomotor ataxy; more often it happens at a much earlier date in this disorder.

Case 13.—On 10th April, 1868, I was consulted by a lady on account of confusion of sight which had lately intervened in the course of an illness of several years' duration. This confusion, she had herself discovered, occurred only when both eyes were open; when either eye was covered, she read her newspaper comfortably with the other, but reading with both eyes was made nearly impossible by the doubling of the type. She was found to have imperfect palsy of both Rect. int. The eyes were divergent and the inward range of the eyeball was very restricted.

She had been confined to her couch for many years by a disorder which began with pricking and numbness of the soles of the feet which made her gait unsteady, and gave rise to the unfounded suspicion that she drank secretly. Some time later she could stand and walk only whilst her eyes were fixed upon her feet. The numbness gradually crept upwards from the soles, and at the time when I saw her the whole surface of her body up to the level of her collar-bones was insensible to tactile stimuli. The muscular power of her limbs was not appreciably weakened, and she could even perform concerted actions, such as taking up her spectacles off a table and putting them on without help; she could also hold her newspaper, but whilst doing this she was obliged to keep her eyes fixed upon the object, for when she took them off, the spectacles or paper fell from her hands. Muscular sense was very defective, she had no correct idea of the force she used, and had, I was told, on more than one occasion crushed the stem of a wine glass which she thought she was holding lightly.

Although it was several years since she had tried to walk, her legs still retained considerable muscular power. She was seldom free from sharp darting pains.

Exposure to cold, which appeared in two of the above cases to be the exciting cause, was probably operative in the

following case where all the third-nerve muscles were involved.

Case 14.—A plasterer, æt. 40, after working in a draught, felt violent pains in the left temple, and the same night for half an hour he had "fearful" pain behind the left eyeball. Next morning he found that the upper eyelid had fallen, and he saw double. Eleven days after this, on 13th May, 1862, when he came under my care at the Royal London Ophthalmic Hospital, of all the muscles of the left orbit, only the Rect. ext. and Obliq. sup. were unpalsied, all the others were absolutely palsied.

The man was feeble, he had had hæmoptysis, and was very liable to headache.

Under the use of iodide of potassium and faradisation the palsies completely disappeared.

Group II.—*Palsies of Muscles supplied by the Third Cranial Nerve concurrent with Palsy of other extra- and intra-ocular muscles.*

In the two following cases palsy of extra-ocular muscles supplied by the third nerve was associated with anæsthesia in the distribution of a transorbital twig of the fifth nerve. The sole cause discoverable in one was an injury, whilst in the other case syphilis was probable.

Case 15.— ——, æt. 38, healthy mother of four healthy children, stumbling in the dark struck her brow against a piece of furniture, slightly cutting the free border of the upper eyelid. A fortnight afterwards, when I first saw her, a small scar marked the injury in the lid, and in the conjunctiva over the insertion of the Rect. sup. She had absolute ptosis of the upper eyelid and complete anæsthesia in the distribution of the supra-trochlear branch of the first division of the fifth nerve. The mobility of the eyeball was perfect. When last seen, five months later, the ptosis was less, and the anæsthesia nearly gone.

Case 16.—A brickmaker, æt. 42 years, came to my polyclinic at the Royal London Ophthalmic Hospital on the 18th

November, 1876, complaining of dizziness and troubled sight, which had come on about six weeks before with pains in the right side of his head, in the neck, and between his shoulders. These he had thought rheumatic, as his work exposed him much in all weathers. They were followed shortly by drooping of the upper eyelid, which in eight or nine days had completely fallen.

He had palsy of all the third-nerve extra- and intra-ocular muscles and anæsthesia in all the transorbital branches of the first division of the fifth nerve.

He had had a chancre twenty-four years before, and of thirteen children his wife had borne three only survived.

In the case now to be related all the extra- and intra-ocular muscles were implicated. Here, too, syphilis was probable.

Case 17.—On May 11th, 1872, a thin, pale-faced, trembling woman, æt. 46 years, came to my polyclinic at the Royal London Ophthalmic Hospital for advice about her left eye. Its optic nerve was in a condition of advanced atrophy. All the muscles (third, fourth, and sixth nerves) were palsied, the pupil, semi-dilated, did not act consensually with that of the right eye in response to light, nor in concert with the accommodation of this eye. The surface of the eyeball and of those parts of the face and scalp innervated by transorbital branches of the fifth nerve were insensible to tactile stimuli. The left ear was deaf, but it was uncertain when hearing first failed.

The patient related that her illness had begun about seven months previously with great pain in the back of her head, and that this was soon followed by drooping of the upper eyelid. Her husband was a sailor often long absent from her. She had borne six children which only survived a few days.

In spite of the free exhibition of iodide of potassium, so useful in similar cases, the affection of the fifth extended to the second and third divisions, and in the following September when last seen ophthalmia and ulceration of the cornea had supervened.

In the preceding case "Ophthalmoplegia Externa," a term which is applied to palsy of all the extra-ocular

muscles was associated with anæsthesia of the fifth nerve. The condition was limited to one side, and the woman's history since marriage made syphilis extremely probable. In the next case every extra-ocular muscle in both orbits was palsied, the intra-ocular muscles escaping; here no evidence of syphilis was present. The patient's manner was frank; he was under my observation during several months; he denied ever having exposed himself to the possibility of infection. No scar of primary sore was discernible, and no history of throat or skin affection could be elicited. His wife, whom I also saw several times, was, and had always been, healthy. She had never had any symptoms which could lead to suspicion of syphilis, and their children (four) were remarkably healthy. Under these circumstances, I submit, the notion of a syphilitic origin of the palsies is untenable, notwithstanding his recovery under iodide of potassium.

Case 18.—On December 15th, 1869, I admitted as an in-patient into the Middlesex Hospital, a tall, muscular, hale-looking carpenter, in order that I might be able to watch him more closely. He had been already at that time for fourteen weeks an out-patient with progressive palsy of the orbital muscles concurrent with a difficulty in walking, which he attributed to numbness of his legs.

When admitted he had absolute palsy of all the extra-ocular muscles of the right side, and nearly complete palsy of all those of the left orbit. The right eyeball was absolutely immovable, and the left eyeball nearly so. Sight was unaffected, each pupil was active, and accommodation corresponding to his age. The fundus oculi had a perfectly normal appearance. He had much headache. His gait was slow and deliberate, with an unsteady balancing manner suggestive of locomotor ataxy. He could, however, stand and walk with his eyes shut. A week later he said that his arms and legs were numb; and this was not merely a subjective sensation, for trial with compass points bore out his statement.

Under full doses of iodide of potassium perseveringly taken during several months the symptoms slowly and completely disappeared, and he was ultimately able to return to work as a

carpenter. When I last saw him, he walked naturally—the distance from Islington to the Hospital, nearly three miles, had not fatigued him—and the mobility of his eyes was perfect.

The number of patients in whom the ciliary muscle and iris were palsied concurrently with one or more of the third nerve extra-ocular muscles was about one-fifth greater than that of the extra-ocular third nerve palsies alone. Syphilis in the intra-ocular palsies was also a fertile cause.

Case 19.— ——, a clerk, æt. 31, steady of late, since marriage, but previously very "*gay*," came under my care at the Royal London Ophthalmic Hospital on 26th April, 1879, for great confusion of sight, which had begun seven weeks previously, and now obliged him to leave off work. He had complete ptosis of the upper lid, and a strong outward squint of the right eyeball, and the extra-ocular third nerve muscles were absolutely palsied. The pupil was widely dilated and motionless, and accommodation was lost. He was drowsy, odd-mannered; he had slight transient hallucinations, and much headache. On his leg was a characteristic tertiary ulcer.

Slight mitigation of the headache, and slight restoration of mobility of the eye followed the use of iodide of potassium, but the improvement was only transient; he soon relapsed and he died in the country in the course of the summer.

The next is very similar to the last case; the evidence of syphilis is scarcely less clear, the interval between the date of infection and the ocular symptoms probably not widely different. The suddenness of the attack and rapid yielding to iodide and recurrence of palsy are not without interest.

Case 20.— —— a gamekeeper, æt. 40, came under my care at the Middlesex Hospital on 10th May, 1867. He had then absolute ptosis of the upper eyelid and palsy of all the third nerve extra-ocular muscles of one eye; the pupil, too, was dilated and motionless, and accommodation was lost.

He said that, eight weeks before, whilst shooting, he became giddy, everything around him looked confused, and soon things seemed to him to be doubled. For four years previously he had

had severe browache, much sleeplessness, frequent vertigo, and nausea. Eight years before the present ocular trouble, he had had a chancre, followed by ulcerated throat.

Under the use of iodide of potassium he made a quick recovery, but he returned in the following November with complete palsy of all the muscles implicated in the previous May; he had now also much pain in the temple and occiput, and nausea. He was again ordered iodide. His further history is unknown to me.

In the following case the evidence of syphilis is scarcely less strong; an acknowledgment of primary sore, without, however, evidence of secondaries.

Case 21.— ——, æt. 30, was suddenly seized with giddiness and confusion of sight, and soon after this his upper eyelid was seen to have fallen.

Eleven days after this he sought advice at the Royal London Ophthalmic Hospital. He had then slight ptosis of upper lid, and impaired action of all the third nerve muscles of one eye. Its pupil also was dilated and motionless, and there was loss of accommodation.

His appearance was healthy, and he affirmed that he had only once been ill, and that a slight temporary indisposition, during the preceding eleven years. On pressing him, however, he acknowledged a chancre six years before the present attack.

In the next case, the interval between the primary sore and the ocular palsy—19 years—was so great that a causal relation might be doubted, but the great mortality of the children strengthens the suspicion.

Case 22.— ——, æt. 42, a feeble, sallow-faced man came under my care at the Royal London Ophthalmic Hospital, on 29th April, 1879.

He saw, he said, two things where he knew only one to be present; he was dizzy, and he often retched.

He was found to have imperfect palsy of the Rect. sup., and mydriasis, and a few days later the Rect. int. was implicated.

During the two immediately preceding years he had had, he said, several similar attacks, which had quickly yielded to treat-

ment. In 1872 he was jaundiced, and since then he had often bilious vomiting. Nineteen years ago he had had a chancre. Soon after which he married. His wife had borne to him twelve children, of which the seven first all died.

The ocular palsies disappeared under the use of iodide of potassium.

ON THE CONTINUOUS ELECTRICAL CURRENT AS A THERAPEUTIC AGENT IN ATROPHY OF THE OPTIC NERVE AND IN RETINITIS PIGMENTOSA.

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I.—*In Optic Atrophy.*

All the cases in which the continuous current was used are here brought forward, with the exception of three: two of these were treated for too short a time to be of any value, and the remaining one was a case of optic neuritis, in which the current was employed during the stage of swelling only.

I must apologise for the frequent imperfections of my notes. In the hurry of daily routine-work observed facts were often left unnoted, and important questions unasked.

Method of application.—I used Weiss' continuous current battery* of twenty-five cells; it was fitted in the ordinary way with sponges, which were moistened in a weak solution of common salt. On employing it for the first time in any case the positive pole (anode) was applied lightly over the closed lids of one eye, and the negative (cathode) to the opposite eye or temple. The power was now gradually increased, beginning with five or seven cells, until a distinct sensation of a flash of light was experienced by the patient on making or breaking the circuit.† The anode was now kept over the eyelids, while the cathode was applied in turn to the top of the spine, to a point just behind the mastoid process, and to the supra-orbital region of the same side, so as to determine which position gave the greatest light-impression. This varied in different individuals, but in the majority of cases the supra-orbital region was selected. This position (*e.g.*, the supra-

* The Foveaux-Smee. The elements are zinc and platinised silver.

† On the characters of the light sensation produced on the healthy optic nerve, see Helmholtz. (Physiologische Optik. Leipzig, 1867, p. 204.)

orbital) being determined, the cathode was kept there for half-a-minute or so, then removed for a few seconds, and finally reapplied for the same period as before. It was next moved to the corresponding point on the opposite side of the head, and then to the closed eyelids of this side; in both these positions it was applied for a few seconds. Both poles were now removed, and the cathode then applied where the anode had been, while the anode was applied to the supra-orbital region, etc., as above.

The same course was then gone through with the other eye, a slightly stronger current being finally used for a few seconds. The whole sitting lasted from five to eight minutes.

The point of selection was determined once for all at the first sitting, and noted.

CASE I.—*Symmetrical failure of ten months' duration. Cause obscure. Improvement immediate, but temporary.*

Charles K——, a Swiss, æt. 37, married. Admitted February 6, 1877, under the care of Mr. Critchett. A pale, thin man of medium height, hair dark brown, irides grey; intelligence very good.

History.—Habits temperate as to alcohol and tobacco. He has been subject to rheumatism for many years. Doubtful history of syphilis. His sight began to fail about ten months ago. He was then, and is still, a sufferer from severe headaches.

No abnormal spinal symptoms. Tendon-reflex not tried. $V = \frac{2}{70}$ with each eye. Colour-perception defective: he calls *green*, "clear red;" *orange*, "yellow;" *black*, "grey;" *crimson*, "clear red." Blue, violet, yellow, and white he names correctly.*

Ophth. Exam.—Both optic discs are white and atrophied.

Ordered nux vomica and iodide of potassium. To have the continuous current daily.

February 12. $V = \frac{8}{70}$.

,, 20. $V = \frac{9}{70}$.

* Holmgren's wools were not in use at this time at Moorfields.

February 25. V = $\frac{10}{70}$ and "P" of $\frac{10}{50}$.

,, 28. V = $\frac{11}{70}$.

On March 15th he was transferred to another hospital. There his sight again deteriorated, and he returned in about two months as an out-patient here, with his vision much as at first. He had been having the battery, but he says "it was not used in the same way."

He attended at intervals for some time as an out-patient, and had strychnine and phosphorus pills, but his sight gradually grew worse. At his last visit he could not count fingers.

While in the hospital, when tested a few minutes after the use of the battery, his vision was always better than before its use; but this marked improvement did not last above an hour or so. The real daily improvement was very small although quite positive.

Case II.—*Symmetrical failure of three months' duration. Rather intemperate in tobacco and beer. ? Syphilis. No decided improvement.*

Charles G——, æt. 25, unmarried. Admitted October 16, 1877, under the care of Mr. Soelberg Wells. Family history unimportant. Patient has always been a strong healthy man. For the last seven years he has smoked a daily allowance of about half-an-ounce of tobacco (cut cavendish). He drinks three or four pints of beer daily. Seven years ago he had what he calls a "soft chancre:" no history of sore throat or secondary eruption. About three months ago his sight began to fail in both eyes. At first there was merely dimness, but this gradually grew worse for about a month, when his condition was as at present.

No marked abnormal spinal symptons.

Pupils sluggish. Irides irregularly pigmented. Tension normal.

Right eye.—V = Bare perception of strong artificial light and limited to lower part of field.

Left eye.—V = Perception of medium light—best in lower and inner part of field. Cannot see objects.

Ophth. Exam.—Right. Disc greyish in colour with absence of capillaries. Arteries reduced in size. Peculiar distribution

with much intertwining of large vessels. Deep physiological cupping.

Left. Disc pale. Arteries small. Deep physiological cup. Below the disc there is considerable retinal degeneration (apparently fatty with cholesterine) and hypertrophy of arterial sheath.

Treatment.—Subcutaneous injection of strychnine daily, quantity gradually to be increased.

Iodide of potassium in mixture. To have the continuous current daily.

November 14.—*Right.* V = Bare perception of hand-reflex as "something white."

Left.—Just sees hand in axis of vision, but nowhere else.

November 16.—The physiological action of strychnine was now very marked, and the injection was discontinued.

November 27.—Tonsils enlarged and superficially ulcerated.

December 8.—V as on last examination. No certain improvement.

December 19.—Discharged.

The very slight improvement which occurred in this case was possibly due to the action of the strychnine.

Case III.—*Gradual symmetrical failure of three years' duration, following injury to head. No improvement.*

Michael P——, æt. 32, widower. Admitted November 14, 1877, under the care of Mr. Wordsworth. A well-nourished man with rather florid complexion. Adherent ear lobes. Intelligence good.

History.—He has always been healthy and temperate. Has worked very hard as fireman at a stationary pit-engine, generally twelve hours a day. In January, 1872 (nearly six years ago), he had a severe injury while employed attending a travelling crane; both legs were broken, and there was a deep wound over the right eyebrow. He lost consciousness and remained unconscious an hour, and soon relapsed into this condition for seven hours. He "wandered a little" in his sleep during that night, and had severe pain in the forehead for several weeks. About three years ago he first noticed dimness of sight in both eyes equally, and at this time he was always very drowsy. The sight gradually failed until September, 1875, when he had to give up work. Since November, 1875 (two years ago), his sight has

been as now. He has never had any pain during the failure of sight except an occasional "shoot" through the head. Last summer he first noticed diplopia. His other special senses have been, and are, perfect. No history of syphilis.

Pres. condition.—There is a deep scar over the right eyebrow, and a patch of grey hair at the part of the head directly opposite. (The latter was noticed about two years after the accident.) Convergent strabismus of left eye. Paresis of both external recti, better marked in left. Pupils semi-dilated and quite inactive. Nystagmus: quick horizontal jerkings. No pain in eyes. Tension normal.

V = Perception of large objects with each eye.

Right.—Field limited peripherally and equally all round.

Left.—Peripheral limitation all round, but most marked outwards and downwards.

Ophth. Exam.—Media clear (examination difficult on account of nystagmus). Both discs are bluish white with atrophic cupping (or rather *saucering*, if I may be allowed the expression). Vessels about normal size: arteries rather small. At or near right macula is a whitish patch. Fundus otherwise looks normal.

Treatment.—Nux vomica in mixture. Continuous current daily.

He describes a large blue flash on making, and a small "darker flash" on breaking the circuit. He required twenty-one cells.

December 8.—V = Bare perception of hand moving at about 8 inches with each—better with right.

December 17.—Discharged.

Case IV.—*Great failure of vision of fourteen months' duration. History of injury to head and of syphilis. ? Locomotor ataxy. No improvement.*

Frank D——, æt. 38, married. Admitted November 27, 1877, under the care of Mr. Lawson.

Born in England, but has been for several years a farmer in Arkansas. He is one of a family of fourteen. A younger sister died suffering from exophthalmic goitre.

About thirteen years ago he had a severe fall from horseback in the hunting-field, pitching on his head. He was not insensible, but he had great pain in the neck for some time after this

injury. A year later he contracted syphilis (secondary eruption, sore throat). About sixteen months ago, while exposed sleeping out at night, he had a severe attack of quinsy, which lasted for about six weeks before the abscess burst. Directly afterwards he felt a numbness in the jaws, and closing the teeth gave him pain. This numbness, he says, gradually crept up his cheeks, affected his temples, and then his sight began to fail,—the right about a month before the left. His wife said that the left eye was at first turned in and he saw double images in the distance. The numbness still ascended until it reached the vertex, where it remained for some time. It is now chiefly confined to two small areas which can be covered by the finger-tips, situated about four inches from one another, one on either side of the median line of the skull and corresponding to the parieto-occipital suture. Pressure on these points causes pain.

The soles of his feet next got numb (about seven months ago), with shooting pains from the heels upwards to the knees. His feet are frequently very cold. About three months ago, he one day had a peculiar sensation in his left arm, "as if it were paralyzed," and he could not carry any heavy weight on it. He has pain on pressure over the left clavicle, corresponding to position of brachial cords. His sight has failed very gradually, with pain along the top of the eyeballs, in the temples, and across the forehead. For the last six months his legs have felt weak, and with his heels together he is very shaky, more so on shutting his eyes. He has no pain in the back, nor feeling of tightness round the waist. Tendon-reflex not tried.

He is a healthy looking man, above middle height, married for last ten years, and has one child eight years old. His health has been good, and his habits are temperate. He used to smoke in moderation.

His eyes look normal: emmetropic. Tension normal.

V = Bare perception of shadows and of hand-reflex at a few inches; better with left than right.

Ophth. Exam.—Right. Disc very white. Arteries diminished in size. Veins have thickened sheaths. Lamina cribrosa well marked; macula normal.

Left. Disc very white. Arteries small. Both arteries and veins have thickened sheaths. Lamina cribrosa as in right.

Treatment.—Iodide of potassium and nux vomica in mixture. Continuous current daily.

December 8.—V certainly not improved. He has less trembling, and walks more firmly.

December 31.—Condition unaltered. Discharged.

Case V.—*Much failure of vision in left eye (less in right) of six months' duration. Moderate smoker. ? Locomotor ataxy. Marked improvement.*

John G——, æt. 23, married. Admitted January 8, 1878, under the care of Mr. Lawson.

A fair-haired, short, well-nourished man. Has been married for a year. No family. No history of syphilis. He used to smoke an ounce and a half of shag tobacco weekly, but left it off on advice a month ago. It made him spit a great deal, and caused him to be very "shaky," especially lately.

Six months ago he first noticed failing sight in the left eye; but in the right only fourteen days ago.

He has weakness in the legs, with aching and pricking. Stands with difficulty with eyes closed. On each tragus there is a small, hard nodule: history of gout rather doubtful.

Pupils are now dilated under atropine. They are said to have acted "irregularly, but not to light," previously: probably with accommodation. Eyes emmetropic.

Tension normal.

Right.—With + 10″ V = small words of Jaeger 6 at about 6″.

Left.—V = Bare perception of hand. Not improved by a lens.

Ophth. Exam.—Right. Disc very pale, with much thickening of sheaths of vessels, especially of arteries. At inner periphery of fundus are numerous small light-coloured spots of degeneration, ? retinal.

Left.—Disc greyish. Sheaths very much thickened, in some quite up to the periphery. One yellowish-white spot between disc and macula. By daylight both optic discs look greenish.

Treatment.—Nux vomica in mixture. Continuous current daily.

January 21.—*Right.* Reads small words of Jaeg. 1 with difficulty.

Left.—Counts fingers at 5″. (Best without any glass). Discharged to-day.

CASE VI.—*Symmetrical failure ten weeks ago. Syphilis. Marked improvement.*

Alexander W——, æt. 29, married. Admitted May 24, 1878, under the care of Mr. Wordsworth.

A short, fairly well-nourished man, with brown hair and greyish blue irides. Intelligence very good.

About eighteen years ago, *i.e.*, when about eleven years old, he had what he believes was a chancre. (From the history he gives this is more than probable.)

Last September (eight months ago) he was laid up with severe pain all over his head, occasionally shooting into his eyes, and preventing him from getting sleep. After being off work for about two months he returned to it (as carpenter) on board ship. Shortly afterwards his headaches recommenced and lasted until about a week ago. Until about eleven weeks ago, he was subject to frequent attacks of syncope. His sight began to fail about ten weeks ago: he did not notice one eye before the other.

Pres. Condition.—Palpitation. Muscular tremblings. No ataxic symptoms. Occasional twitching in arms during sleep. Has sometimes had a feeling like a "tight drawing," round his right side.

Pupils barely act to light. Tension normal.

Right.—V = Barest perception of the gas-flash (*i.e.*, the gas turned suddenly full on and then turned off again).

Left.—V = Fingers at one foot.

Ophth. Exam.—Right. Disc greyish white. Vessels small: well marked sheath outline. Margin of disc rather indistinct. Retina looks hazy, with a few yellowish-white dots near the macula. H $\frac{1}{16}$.

Left.— Disc pale, margin indistinct. Vessels rather small, with sheath outline in both arteries and veins. Retina somewhat opaque. H $\frac{1}{12}$.

Treatment.—Iodide of potassium and nux vomica in mixture. Continuous current daily.

June 2.—*Left.* Counts fingers at 6 feet against a dark background. Reads letters of Jaeger 18 at 7″.

June 5. *Left.* Counts fingers at 10 feet. Letters of Jaeg. 16.

„ 13. Doses of nux vomica and iodide of potassium increased, now takes 13 minims of former and 10 grains of latter thrice daily.

„ 14. *Left.* V = Words of Jaeger 16 and $\frac{13}{200}$.

Right. V = Bare perception of hand.

„ 25. To have 16 minims of nux vomica and 15 grains of iodide three times a day.

July 8. *Left.* V = $\frac{17\frac{1}{2}}{200}$. Jaeg. 16 and very nearly Jaeg. 14.

Oct. 2. *Left.* Reads Jaeg. 14.

Right. Sees hand-reflex.

„ 18. V as on last trial. Discharged.

CASE VII.—*Failure of sight in both eyes (old in left). Myopia. Papillitis. Improvement.*

Michael R——, æt. 29. Admitted May 25, 1878, under the care of Mr. Streatfeild.

Family history unimportant. No history of gout, rheumatism, or syphilis. Used to have pain in testicles.

Three years ago he first noticed that the sight of the left had failed. He went to another hospital where condition was then diagnosed as neuritis. For the last three months or so, the sight in this eye has improved, while that in the right has been growing worse.

General health fairly good. No headaches.

Pupils active. Irides greyish blue, with dark hazel spots. Tension normal.

Right.—With − 9″ V = $\frac{20}{100}$ and 'L' of $\frac{20}{70}$. Reads Jaeg. 4 at 6″.

Left.—With − 9″, and V = $\frac{20}{200}$. Reads Jaeg. 6 at 4″. Letters look jumbled and distorted.

Ophth. Exam.—Right. Disc much injected and rather hazy. To outer side is a linear puckering of retina.

Left. Disc hazy, ill-defined. Veins large and dark. There is a white horizontal line of retinal puckering (linear detachment) just skirting lower edge of disc and running more or less directly

outwards and inwards to the periphery, where it becomes lost. Near the peripheral parts of the fundus, especially out and in, are extensive changes in choroid and retina. Floating bodies in vitreous.

Treatment.—Iodide of potassium. Continuous current daily.

June 2. *Right.* Reads Jaeg. 4 at 5″.

,, *Left.* ,, Jaeg. 1.

,. 8. Ordered nux vomica. To have continuous current every second day now, as he complains of headache following its use.

,, 12. Near vision as at last examination. Distant vision has not improved since admission. Discharged June 13.

CASE VIII.—*Great loss of vision in both eyes of long duration. Rheumatism. No improvement.*

Eliza F——, æt. 23. Admitted July 24, 1878, under the care of Mr. Streatfeild.

Mother suffers much from rheumatism or rheumatic gout. Patient has rheumatism in "every joint."

Her sight began to fail about four and a half years ago: the left eye diverged soon afterwards and has remained so. Has had occasional pain in temples and occiput since failure of sight began.

Left eye. Divergent, pupil sluggish. V = Bare perception of hand.

Right. V = Fingers at 5″. Irides greenish grey with hazel dots.

Ophth. Exam.—Left. Disc very white, with much diminution of vessels.

Right. Disc atrophic, with yellowish-white degeneration at macula.

Treatment.—Nux vomica and iodide of potassium internally. Continuous current daily.

August 22. V as before. Ordered tincture of nux vomica and tincture of perchloride of iron, of each, 15 minims three times a day.

,, 28. V as on admission. Discharged.

CASE IX.—*Symmetrical failure nine months ago. ? Tobacco and Alcohol. Rheumatism. No improvement.*

John R——, corn-porter, æt. 44, married. Admitted July 29, 1878, under the care of Mr. Streatfeild. Family history unimportant. Patient is a healthy looking man with ruddy complexion, light flaxen hair, and light coloured irides. He has often to lift very heavy loads at his work.

Health has always been good, with the exception of rheumatic fever twelve years ago. No history of syphilis. He drinks four or five pints of beer daily, and smokes two ounces tobacco (twist) weekly.

About nine months ago his sight began to fail in both eyes simultaneously. At first they watered much, but he had no pain in them nor in the temples. No symptoms of spinal affection.

Pupils active. V = Jaeg. 20 with each. Colour perception good.

Ophth. Exam.—Discs decidedly pale. Vessels slightly diminished in size, especially in right.

August—2. Ordered solution of perchloride of mercury and iodide of potassium.

,, 7.—Continuous current daily, and nux vomica.

,, 21.—V as on admission. Discharged.

CASE X.—*Failure of vision during last year. Syphilis. Temporary improvement.*

William F——, bricklayer, æt. 31, married. Admitted September 30, 1878, under the care of Mr. Lawson. He was in the army from 1868–75, and while there contracted syphilis.

He is rather pale and nervous. Light hair and complexion. Complains of sleeplessness; and has had severe headaches occasionally lately.

Sight began to fail about a year ago. It grew gradually worse, and last April he was unfit for work.

Pupils dilated and inactive. Tension normal. Emmetropia.

Right. V = $\frac{20}{200}$.

Left. V = Bare perception of hand reflex.

Ophth. Exam.—Right. Disc greyish white. Vessels about normal size, perhaps slightly diminished. Retina opaque looking.

Left. Disc as in right, but retina clearer. Thickened vascular sheath well marked near disc.

Treatment.—Bromide of potassium and tincture of hyoscyamus at bedtime. Iodide of potassium in mixture. Continuous current daily.

October 8. Much pain in forehead.

„ 14. Pain has extended to temples. Relieved by Heurteloup's artificial leech.

October 16. Ordered nux vomica.

„ 17. Had severe pains in head again yesterday; relieved by Heurteloup.

October 28. *Right.* V = $\frac{20}{70}$ perfectly.

Left. V as before.

November 1. *Right.* V = $\frac{20}{70}$ and 'P' of $\frac{20}{50}$.

Left. V as before. Discharged.

Re-admitted, February 11, 1879.

Right. V = $\frac{20}{200}$. *Left* V. = Barest perception of light.

So both have deteriorated. He is quite unable to distinguish colours, only describes their depth. He is in a highly nervous condition, and feels his position acutely, often shedding tears.

Ordered nux vomica, iodide of potassium, and continuous current as before.

April 10. He has occasionally complained of headache and giddiness. No evidence of spinal disease. At first he thought his sight was improving again, but lately it has become worse.

Right. V not $\frac{20}{200}$ quite. Discharged.

Case XI.—*Failing sight of three years' duration. ? Locomotor ataxy. Considerable improvement.*

Edward H——, æt. 44. Admitted October 1, 1878, under the care of Mr Lawson. Health failed five years ago while on the Gold Coast. No history of syphilis. Has smoked two ounces

weekly. Subject to flying pains all over his body. No other ataxic symptom noted. Has not had headache, with the exception of occasional slight pain in temples.

The failure of sight commenced three years ago, while suffering from a severe attack of jaundice.

For last six months sight has been as now.

Pupils inactive.—Tension normal.

Right. V = $\frac{10}{200}$. *Left* V = Barest perception of light.

Ophth. Exam.—Discs very white with atrophic cupping. Arteries small. Veins normal or slightly diminished.

Treatment.—Potass. iodid. and nux vomica.

Continuous current daily.

October 28. *Right.* V = $\frac{19}{200}$. *Left.* V as before.

December 21. Battery discontinued for a few days just now.

Has had considerable pain round left eye for last few days. Thinks it was caused by prolonged opthalmoscopic examination.

Dose of iodide and nux vomica increased.

December 27. Has still neuralgia on left side.

„ 31. *Right.* V = $\frac{20}{70}$. *Left.* V = Bare perception of hand reflex.

February 13. *Right.* V = $\frac{20}{70}$. Hm. $\frac{1}{20}$. *Left.* V = hand-reflex.

He confuses red, green, and yellow: calls them all yellow of different shades. Recognises blue and pink. Discharged February 15, 1879.

Case XII.—*Gradual failure for last nine months. Locomotor ataxy. Doubtful Improvement.*

Charles K——, æt. 41. Admitted December 9, 1878, under the care of Mr. Lawson. No history of syphilis. Sight has failed gradually, without pain in the head, for the last nine months or so; and he had to give up work in consequence a fortnight ago. He has shooting pains in the front of the leg, from the knee to the ankle. He staggers somewhat on closing his eyes when standing with heels together. No tendon-reflex. No feeling of distinct abdominal constriction.

Right eye. Pupil small and inactive. V = Barest perception of light. Tension normal.

Left eye.—Pupil larger than right; acts momentarily to light, then dilates and oscillates. V = Fingers at 5 feet. Tension normal.

Ophth. Exam.—Both optic nerves are atrophic, especially the right. Larger vessels normal. Slight "saucering" of discs.

Treatment.—Nux vomica. Continuous current daily.

December 31. *Right.* V as before.

Left. V = Fingers at 8 feet.

January 9, 1879. Discharged. V as on last examination.

Case XIII.—*Gradual recent failure of sight. ? Locomotor ataxy. Slight improvement.*

Alexander S——, æt. 32, unmarried. Admitted December 19, 1878, under the care of Mr. Streatfeild. About seven years ago he had a fall from a top-gallant yard, and was unconscious for some days. He soon recovered from this accident, but two years later he fell from a royal yard, and fractured his thigh. On this occasion he was unconscious for eight days. No history of syphilis.

Last February (ten months ago) he first noticed dimness of sight and sparks before the eyes. For the next six months his vision failed gradually and painlessly; for the last four months it has been as now.

On being tested with eyes closed, he rocks considerably. No tendon-reflex.

V = Bare perception of light, rather better with left.

Ophth. Exam. Discs white and "saucered." Large vessels normal.

Treatment.—Nux vomica and iodide of potassium in mixture. Continuous current daily.

February 10, 1879. V = Hand-reflex, rather better with left. Discharged.

Case XIV.—*Rapid failure of sight in both eyes. Nature obscure. ? Early Locomotor ataxy. Arrest of failure in one eye, but no improvement.*

John J——, æt. 25, single, farm-labourer. Admitted March 12, 1879, under the care of Mr. Streatfeild. Father died young:

suffered from abscesses. Of the family, two are dead; one brother alive, who is quite strong.

Patient does not smoke, and only drinks moderately. No history of syphilis, nor of injury. Has "rheumatism" in knees. Sight has been failing for five months in the left, and for two months in the right eye. He has had slight temporal pain occasionally. Tendon-reflex very good; ? exaggerated. Stands well with eyes closed. A thin, healthy-looking man: teeth good. Hair dark auburn: light hazel irides.

Right eye.—Pupil active. Tension normal. V = $\frac{20}{200}$ and Jaeg. 8 at 6″ Optic disc pale, with deep physiological cupping.

Left eye.—Pupil rather sluggish. Tension normal. V = Bare perception of light. Disc pale, with deep physiological cupping, venous pulsation. Film in vitreous over vessels to inner side of disc.

He fails to recognise the colours *blue* and *red* (the latter he calls green) with right eye. The left has no colour-perception.

Treatment.—Ordered nux vomica and iodide of potassium.

Continuous current daily.

March 28. Has severe frontal headache and weight in eyelids. Dose of iodide of potassium increased.

April 7. *Right.* V = $\frac{20}{200}$ and Jaeg. 6 at 6″ barely.

Left. No perception of light.

Has relaxed sore-throat. Ordered tincture of perchloride of iron.

May 3. Discharged. V as on last examination.

CASE XV.—*Old post-papillitic atrophy. History of injury to head. No improvement.*

James F——, æt. 14. Admitted April 23, 1879, under the care of Mr. Lawson. About two and a half years ago, while exercising on the bar (at the Naval School, Greenwich), he fell, alighting on his vertex. The height was about 4 feet and underneath was a hard mattress. He was unconscious for two hours, and for the next week he had pain all over his head. He says a "thick mist" used to come repeatedly before his eyes, and each time it left the "fog" thicker. This failure of sight was first noticed three months after the injury.

Six months after the above accident (March, 1877), he was admitted as an in-patient at Moorfields, under the care of Mr. Bowman, in the following condition:—

Right eye. Spasm of lower orbicularis fibres. Tension normal. Field good.

V = Jaeg. 6 at 6″.

Left eye. Tension normal. Field good. V = Jaeg. 20 at 6″ barely. Colour perception good in each.

Ophth. Exam.—Both discs are swollen; the veins large, dark, and tortuous.

Treatment.—Iodide of potassium two grains and a half three times a day.

His sight slightly deteriorated, and severe headaches, with morning sickness and vomiting appeared.

On April 21, 1877, he was transferred to the care of Dr. Hughlings Jackson, at the London Hospital. At that date my note is:—

Right. V = Jaeg. 8 at 4.″ Disc much swollen; at its lower part is a peculiar apparent obstruction in a vein.

Left. V = Jaeg. 16 at 4″.

On re-admission now, two years later, his vision is somewhat worse than on last discharge. He is in perfect health, and well-nourished.

Right eye slightly divergent now: has been so for more than a year.

Right (under atropine) with + 10″ V = Jaeger 20 letters.

Left „ „ with + 10″ V = Jaeger 19 *barely.*

Ophth Exam.—Disc white, with irregular margins. Vessels diminished in size, especially in left. There is perivascular thickening in left.

Treatment.—Nux vomica and potass. iodid. internally. Continuous current daily.

June 5. V not improved. Discharged.

Case XVI.—*Recent failure of sight. Probably Renal Disease. No certain improvement.*

George B——-, labourer, æt. 25, admitted June 16, 1879. About fifteen months ago he had a "chancre"—probably soft. His sight began to fail eight months ago, while he was suffering from renal dropsy—"the result of a chill."

He now suffers much from headaches, across the forehead and behind the ears. Health good (no note of urine). Hair dark brown: irides greyish-blue.

Right eye. Pupil fairly active—rather wide. Tension normal. V = Fingers at 2 feet, at inner part of field only.

Left eye. Tension normal. V as in right, or slightly better.

Ophth. Exam.—Extensive changes of an atrophic nature in discs, retina, and choroid: the latter in peculiar broad lines. Also dots and streaks at macula like albuminuric retinitis.

Treatment.—Strychnine and phosphorus pill. Continuous current daily.

June 27. *Right.* V = Fingers at 2 feet.
Left. V = Fingers at 4 feet.

August 13. V as on last report. Discharged.

CASE XVII.—*Recent rapid loss of sight. ? Locomotor ataxy. No improvement.*

Ann M——, married, æt. 60. Admitted October 28, 1879, under the care of Mr. Wordsworth. She had two miscarriages about ten years ago, but has had no family. Her health has been good until ten months ago, when she had severe headaches. These lasted for a month, and at the end of that time she noticed that the sight of her left eye had failed greatly. It has since got still worse, and about five months ago the right began to grow dim. In the last two or three months she has been much as now. She has pain in the lumbar region and sometimes has a feeling of constriction round the waist. Stands well in darkness.

Right eye.—Pupil dilated from atropine. Tension normal. V = Nil, or barest perception of the gas-flash.

Left eye.—Pupil inactive. Tension normal. No perception of light.

Ophth. Exam.—Right. Deep saucering of disc; veins rather tortuous; capillary circulation of nerve fairly good. Macula not marked by the usual difference of tint.

Left. Much as in right, but the outer side of the disc is here atrophic and white.

Treatment.—Continuous current daily.

She only gets a very faint light-impression with 25 cells.

November 6. Discharged. V not improved.

CASE XVIII.—*Recent failure of sight. History of Syphilis and of injury to spine. No improvement.*

Thomas R——, sailor, æt. 35. Admitted October 30, 1879, under the care of Mr. Lawson. He had syphilis twenty years ago. About ten years ago he was struck severely on the lower part of the back by the fall of a plank of wood: his back has been more or less painful ever since.

Four months ago "everything looked double;" the right eye was then drawn in towards the nose. A week or two later his sight became dim.

He suffers now from very severe headaches, with giddiness. Tendon-reflex low.

Pupils semi-dilated and feebly active. Tension normal.

Right. V = Fingers barely at 4″.

Left. V = Same as with right—rather clearer perhaps.

Ophth. Exam.—Right. Disc atrophic. Edge indefinite from marginal choroidal changes. Several spots of choroidal atrophy near disc.

Left. Disc pale and slightly swollen. Choroidal changes as in right.

Treatment.—Continuous current daily.

November 3.—Severe frontal headache, chiefly on right side. Relieved by Heurteloup's leech.

November 6.—Ordered dry cupping (with Heurteloup's cylinder) behind each ear. Iodide of potassium.

November 10.—Discharged. V not improved.

Of the above eighteen cases, six distinctly improved under treatment; four others received doubtful benefit; and eight did not improve at all, or grew worse. Of the six improved cases, two returned to hospital some time after their first discharge with their sight as bad as ever, and on this second occasion neither benefited by any treatment.

From the small number of cases, and from the fact that no such reliance was placed in the treatment by the electrical current as to justify one in trying it *alone*, no really conclusive results have been obtained. At the same time, when we consider the nature of the other treatment, and when we compare the above results with those obtained where no

galvanism was employed, a strong presumption must remain with us of the utility of the continuous current in certain cases. As regards the other treatment referred to, it consisted generally of nerve tonics (especially strychnine), iodide of potassium, and good feeding. The iodide I believe is utterly useless in cases such as the above. Strychnine subcutaneously administered has been strongly recommended, but our experience at Moorfields of its usefulness was most unsatisfactory in a series of cases in which it was tried by Mr. Buller, late house-surgeon. Possibly, however, strychnine, as well as other nerve tonics, and good food certainly, may be important adjuvants to the usefulness of the continuous current.

Notwithstanding the inconclusiveness of the results, however, it will be well to analyse the above cases with a view to ascertain how far it may be possible to prognosticate of any case as to the probable benefit to be derived from this mode of treatment. For this purpose I shall consider each group in reference to age, etiology, duration, and amount of amaurosis, colour-perception, occurrence or non-occurrence of pain during failure, and the ophthalmoscopic appearances. For the sake of brevity, I shall call the improved cases group A, the doubtfully improved A^1, and the unimproved cases group Z.

Age.—In groups A and A^1 it averaged thirty-one years, and in group Z thirty-four years. One of the oldest patients improved satisfactorily under treatment. Age *alone* would of course be useless as a means of prognosis but probably, other things being equal, the younger the patient the greater the probability of success.

Etiology, &c.—There was a history of a somewhat excessive use of tobacco, alcohol, or both, in one case of A^1 and of Z, but neither was to be confounded with a true case of toxic amblyopia.

There was a positive history of syphilis in two cases of A and in two cases of Z: and a doubtful history in one case of A and two cases of A^1.

There were symptoms of locomotor ataxy in two cases of A, in two cases of A^1, and in three cases of Z.

History of rheumatism in one case of A and in three cases of Z.

Injury.—In one case of A^1 and in four cases of Z.

Renal Disease.—In one case of A^1.

Duration of Amaurosis.—In group A it ranged from fourteen days to three years; in group A^1 from three months to three years; and in group Z from four months to four and a half years.

There is no doubt that the more recent the amaurosis the more likely it is to be benefited by any treatment, but a recent case may be otherwise an unfavourable one.

Amount of Amaurosis.—In group A, vision varied from fingers at 1 foot up to Jaeg. 4 with the better eye; in group A^1 from bare perception of large objects up to fingers at 5 feet; in group Z from bare perception of light up to Jaeg. 20. In one case of group Z the better eye saw Jaeg. 8, but as the failure was at least arrested for the time in this eye by treatment, it seems better to mention it separately.

The greater the amount of vision retained, therefore, the better hope of benefit. But here, as in the last series (*Duration*), the successful and unsuccessful cases overlap one another, showing that there must be some other very important element in the prognosis.

Colour-Perception.—Of groups A and A^1 only three were tested properly: all these were defective. Of group Z also three were tested: one was defective, two were good.

The unsuccessful cases, therefore, seem to have retained colour-perception better than the others, but unfortunately the majority of the cases were not properly examined in this particular.

Occurrence of Pain.—There were headaches more or less severe in five out of the ten cases of groups A and A^1, and in five out of the eight cases of group Z.

The fact of pain having occurred or not depends, of course,

on the true pathological history of the case; but in ignorance of the exact nature of the latter, I thought it well to make a distinct heading of such a prominent symptom. Its prognostic value seems nil.

Ophthalmoscopic appearances.—The large vessels of the disc were normal in size in three cases of groups A and A^1 but in no case of group Z. They were diminished in two cases of A and A^1 and in every case of Z. The size of these vessels was not noted in three cases of A and A^1 and in one case of Z.

The perivascular sheath was notably thickened in three cases of group A and in three cases of group Z.

There were visible retinal or choroidal changes in four cases of groups A and A^1, and in four cases of group Z.

There seems to be a definite connexion between the size of the large vessels and the probability of improvement under treatment, the prognosis being bad where the size is diminished.

As the result of this imperfect analysis, then, we would give the most favourable prognosis where the patient is young or middle-aged, with recent failure of sight and present ability to count fingers at least. Colour-perception is possibly defective. The disc is white, but the large vessels are of normal size. There is no history of severe injury to the brain or spinal cord, but perhaps there are symptoms of locomotor ataxy.*

II.—*Retinitis Pigmentosa.*

While making the above investigation on the use of galvanism in optic atrophy, every such case that was

* For an excellent report on the use of galvanism in six cases of Optic Atrophy, see a paper by Mr. R. J. Pye-Smith, in Brit. Med. Jour. for May 18th, 1872. Of the six cases, two improved decidedly, and two doubtfully. It was at this gentleman's suggestion that I commenced this method of treatment.

Dr. Fraser, of Paisley, also reports a case in which there was decided improvement. See Glasgow Medical Journal, 1872, p. 163.

admitted as an in-patient was treated in this manner. Among the rest was the first case now to be detailed, in which the optic atrophy was secondary to, or at any rate accompanied by, retinitis pigmentosa. Here the result was so very encouraging and so much more brilliant than in ordinary cases of atrophy, that I determined to try the same treatment on the next case of retinitis pigmentosa that presented itself. Only one other such case was obtained, and here again the result was good.

For the other two cases given here I am indebted to Mr. G. A. Berry and to Dr. W. Charnley, who kindly undertook to try the effect of the same mode of treatment on any patients that might come under their notice.*

Case I.

Watts T——, æt. 42, weaver, married. Admitted November, 20, 1878, under the care of Mr. Streatfeild. He has four children alive and three dead; the last two were stillborn. He had a sore under his foreskin about six years ago, but he gives no history of secondary symptoms. His sight, he says, has failed for the last eight years, and his health has been bad for about the same time. Lately he has been obliged to give up work. He is a thin man, with dark hair and complexion. Health delicate, with mental depression. He is unsteady when tested with his eyes closed, and he has a feeling of tightness round his waist. He says he feels "drunk and pulled down."

Right. V = Fingers at 3 feet.

Left. $V = \frac{20}{200}$; with $-36'' = \frac{20}{70}$.

Field contracted. Tension normal in both. Colour perception good, but sometimes confuses green and blue.

Ophth. Exam.—Well marked retinitis pigmentosa, with atrophy of disc and considerable diminution of vessels in each eye.

* These gentlemen continued the treatment steadily in their cases for a considerable time, and were most particular in mapping out the field at short intervals. The field-charts are very valuable records. It has been judged sufficient to publish here the field of each eye before commencing and at the conclusion of all treatment.

Treatment.—Iodide of potassium and the continuous current daily.

December 31.—*Right.* V = Fingers at 18 feet. $\frac{20}{200}$ and nearly $\frac{20}{100}$ in *extreme outer part of field.* With $-40'' = \frac{20}{100}$ centrally. His field has therefore improved.

Left. V = $\frac{20}{70}$; with $-40'' = \frac{20}{50}$ fairly.

January 28, 1879. *Right.* V = $\frac{20}{200}$; with $-40'' = \frac{20}{100}$.

Left. V = $\frac{20}{70}$ nearly, and with $-40'' = \frac{20}{70}$ and 'T' of $\frac{20}{50}$.

The light is bad to-day.

Iodide of potassium discontinued.

April 21. *Right.* V = $\frac{20}{70}$ barely, with $-40'' = \frac{20}{70}$. Reads Jaeg. 8.

Left. V = $\frac{20}{40}$ barely. Prefers weak concave, but sees no more. Reads Jaeg. 4.

Light fairly good to-day.

May 16. V as on last report. His general health has improved while in hospital. Discharged. He went home to Leicester, where Mr. Hodges kindly continued this treatment in the Ophthalmic Hospital there. Some months later he again came to Moorfields with his sight as good as on his discharge. (The notes of this visit cannot be found, and I only speak from memory).

Case II.

James D——, æt. 33, printer, single. Admitted November 9, 1879, under the care of Mr. Tay. No consanguinity of parents. Maternal uncle was "short-sighted," but patient believes that he was able to see his way about at night.

Health has been good, except that he had very severe rheumatic fever when a boy.

He says he could never see so well as most people, but he

was able to do very fine work (reading theodolites, &c.) till lately. Twelve months ago his sight became so bad that he could not find his way about after dark, but he thinks that he has not got worse in this respect since then. He has never had any pain in or around his eyes. Recently he had to give up work on account of failure of sight, even by daylight.

He is rather thin. Hair and complexion dark: irides light coloured.

Pupils fairy active. Tension normal in both. Field of vision peripherally in each.

V = Jaeg. 4, barely, with each.

Ophth. Exam.—Right. Much pigment in retina in characteristic forms: it extends well up to the disc-margin. Slight choroidal atrophy near disc.

Left. Well marked choroidal atrophy at outer side of disc. Pigment not so much as in right, and not in such large masses. Retinal vessels considerably diminished in both eyes.

Treatment.—Continuous current daily. He uses twenty-five cells for about three minutes each morning.

November 15.—Immediately after the use of the battery to-day he can read Jaeg. 1, in a comparatively dull light.

December 20.—He was unwilling to admit improvement at first, but he has now no doubt of it. He reads Jaeg. 1 fluently with the right, and barely with the left eye. V = $\frac{20}{100}$ barely with each.

A few days ago he went back to his former employers and satisfied them that he was fit to return to his usual work. Discharged to-day.

CASE III.—*From Dr. Charnley's Notes.*

Fanny R——, æt. 20. Came to Moorfields as an out-patient October 6, 1880, under the care of Mr. Tweedy.

There is no history of consanguinity in marriage except that her grandfather married a second cousin. No insanity in the family, and no other member of it has weak sight.

General health has been fairly good.

Three years ago she first found a difficulty in walking alone in the street on account of running up against people: at that time she was suffering from amenorrhœa. Since then she has become nyctalopic.

She is a rather delicate looking blonde with light grey irides.

Right eye. $V = \frac{20}{100}$; with $-2 \cdot 0$ D $= \frac{20}{70}$. Jaeg. 1 at 12″.

Left eye. $V = \frac{20}{70}$; with $-1 \cdot 0$ D $= \frac{20}{40}$. Jaeg. 1 at 12″.

Field of vision very much restricted in each eye, not extending beyond the 10° circle in any direction. (See chart.)

Ophth. Exam.—Right. Disc seen only hazily as through a thin veil. At the lower part there is a tag of something like lymph in front of the vessels.

Arteries and veins of normal size. Near the disc, the fundus is beset with minute black specks: towards the periphery the pigment takes the usual stellate shape, and is in front of the retinal vessels. No streaks of pigment visible along the vessels. No perivasculitis. In the left eye the condition is very similar.

Treatment.—Continuous current daily. About 13 cells were used. The sponges were usually placed one on the closed eyelids and the other on the supra-orbital region on the same side, but both sponges were moved about along the skin within narrow limits. Occasionally the sponges were placed one on each eyeball.

October 7. Patient is sure she sees better. The chart of the left field was taken before and immediately after the use of the battery to-day: the former shows slight improvement from yesterday, the whole field being now a little beyond the 10° circle. The field after the battery is still wider, extending to the 20° circle downwards. The extreme periphery of both fields carefully tested now: it is found that in that part of the field she cannot distinguish a piece of white paper 5″ × 3″. The scotoma is therefore not simply annular.

Colour-perception good, but she confused a light sea-green with blue.

October 9. At extreme outer periphery of each field of vision she can now distinguish the hand against a dark back-ground, and can tell correctly the direction in which it is moved.

This small perceptive island is represented on the chart by an almost round space reaching from the 60° to the 70° circle in the left eye.

October 11. In both eyes a piece of white paper 5″ × 3″ is

seen well at the extreme outer periphery, but not between the limits 25° and 70°.

October 14. The central field is steadily enlarging and the peripheral island is increasing vertically.

October 20. *Right.* $V = \frac{20}{70}$; with $-2{\cdot}0$ D $= \frac{20}{30}$ nearly.

,, 28. *Right.* $V = \frac{20}{100}$; with $-1{\cdot}75$ D $= \frac{20}{30}$ partly.

Left. $V = \frac{20}{100}$; with $-2{\cdot}0$ D $= \frac{20}{30}$ partly.

From this time onward the field of vision of both eyes gradually widened. Improvement came latest above.

The treatment was continued daily, excepting Sundays, until December 18.

December 20. She was sent back into the country in the following condition:—

Right. $V = \frac{20}{70}$; with $-1{\cdot}50$ D $= \frac{20}{30}$ partly.

Left. $V = \frac{20}{70}$; with $-1{\cdot}50$ D $= \frac{20}{30}$ partly.

For field of vision now, see charts.

Case IV.—*From Mr. Berry's Notes.*

Henry A——, æt. 22, admitted under the care of Mr. Wordsworth. Two first cousins have nyctalopia. The night blindness is one of his earliest recollections and must have existed, according to his mother's statements, when he was three years old. He does not think it any worse now than it ever has been.

He has been repeatedly treated by medical men in London and elsewhere, but observed no improvement from their treatment, which always consisted of *medicaments*. He is a short man; well-nourished and healthy looking. Complexion dark.

Reads Jaeg. 1 easily. V with $-3{\cdot}0$ D $= \frac{20}{40}$ barely.

His field of vision extends no further than 15° in either eye. He is completely red-green blind, and partially blue-yellow blind, so that there is almost total absence of colour-perception: of this he seems to have been aware. His power of distinguishing

shades varying slightly in intensity is diminished decidedly, though not to a great extent.

Ophth. Exam.—Discs of characteristic pallor. Vessels very decidedly diminished in calibre. Well marked retinal pigmentation coming close up to the papilla, but scanty towards the ex-periphery.

Treatment.—Continuous current daily. Number of cells used 19 to 21, and employed for about ten minutes.

Until the end of November the state of the field was ascertained every day, *i.e.*, one day the right, and next day the left eye. For the first half of this time the charts only indicate the amount of field standing after electrisation. In the second part it was always taken both before and after applying the current. The difference shows, I think, an improvement on the whole *immediately after* the current, though once or twice this was not apparent. At all events, at the end of the treatment the field was undoubtedly more extensive than at first. The improvement was more marked in the right eye, and only took place outwards and downwards, where it extended to from 70° to 90°. Although the field extended in this way, the peripheral vision was very imperfect and undecided.

There was no improvement in central vision, nor in the night blindness.

In this case, as in Dr. Charnley's, a perception-island appeared near the outer periphery of the field in each eye. This is first noted in the chart on November 26; at the same time the central field was prolonged in a tongue-shaped projection towards this island, until at last they met, giving rise to the peculiarly shaped field depicted in the chart of December 10.

On my writing him, enquiring how his sight was, and wishing him to come to hospital and be examined, he replied from the country, on January 20, 1881: "I am thankful to say that my sight is slowly getting better. My sight was getting better during the time I was in Moorfields Hospital."

All the cases of retinitis pigmentosa were therefore improved by this treatment.

On looking up the literature of the subject, I find that galvanism has been tried by several different authorities in this disease, but encouraging results are only reported by Neftel and Dor. The former reports one case*. Here the patient was unable to read, and could not walk alone in the street before treatment; after a continued use of galvanism he could walk alone and read for several hours daily.

Dor† gives three cases, in all of which there was considerable improvement in central vision. Why others should not have been equally successful may possibly be partly explained by their method of applying the current, or by the vision having been too far deteriorated before treatment was commenced.

My reasons for believing that galvanism will prove especially serviceable in the treatment of retinitis pigmentosa, are founded chiefly on the above experience of its use, and partly on a consideration of the nature of the failure of vision in these cases. The pigment deposited in the layers of the retina absorb the rays of light, which would otherwise penetrate and stimulate certain of the rods and cones. The nerve fibres in connexion with these retinal end-elements are now thrown absolutely out of employment. Corresponding with the distribution of the pigment over the fundus, in early cases we find an *annular scotoma;* but soon the more peripheral field also fails, the part within the blind ring contracts more and more, and finally central vision itself deteriorates. Night-blindness becomes a more prominent symptom, since much of the light is lost by absorption in the pathological pigment; the deficient blood-supply interferes with rapid tissue change, and a degenerated nerve conveys with difficulty stimuli which in themselves are abnormally feeble. The mere fact of the nerve being no longer acted on by normal stimuli assists in the atrophic

* Neftel, Galvanotherapeutics. *See* Nagel's Jahresbericht, ii, pp. 207–8.

† Dor. Archiv. f. Ophth. Bd. xix, Abth. 3, pp. 342–5.

process, and it is this secondary atrophy from disuse that I believe the continuous current is qualified to prevent.

From the experiments of Holmgren, and later of Dewar and McKendrick, we know that the stimulus of light on the retina causes an increase of the normal electrical current passing along the optic nerve and tract from periphery to centre. Again, as a matter of personal observation, we know that the continuous current applied to the temples or over the eyes causes a sensation of light. From these facts we may, without assuming the identity of the electrical and nervous currents, argue that the optic nerve conveys to its centre in the brain, both the electrical current and the current originated in the impression produced upon its end-organs by waves of light. It is this *conductivity* of the nerve which the continuous current is capable of stimulating and of preserving.

Possibly galvanism has also a *temporary* effect in dilating the retinal blood-vessels, and thereby improving the nutrition of the tissue. Such an effect has been observed by some authorities (Roosa, Lornig, Hackley) from its use in the normal eye. In the cases I have seen, there has certainly been no *permanent* result of this kind observable after long-continued treatment.

But whether the above explanation be the true one or not, I trust others will be induced to try this mode of treatment. Were it only to prove serviceable in exceptional cases, it would still be our duty to *try* it in every case, until we knew precisely in what class it might be expected to do good.

Galvanism has, in many departments of medicine, proved very disappointing; this fact, coupled with its frequent association with charlatanism, has caused a professional prejudice against its use. This will deter no one from employing it where he has reason to expect benefit. Again, it may be argued that cases such as the above only improve while under treatment, and that when the patient leaves off attendance, his condition deteriorates as before. This argument will apply to many other forms of treatment quite as forcibly as to galvanism, even supposing it be always true.

There is, moreover, nothing to prevent even a hospital patient learning to use the battery for himself; and the cost of an efficient instrument now places it within the reach of, at any rate, *most* of those in whose cases it would be valuable.

I may add a word of caution to any one using galvanism for the first time in any case, especially when it is to be applied to the head. Always begin with a weak current (of five or seven cells), and let the first application be a short one. When the idiosyncrasy of the patient is thus determined, the current may be gradually increased if necessary, and the application continued for a longer time.

I cannot conclude without thanking the surgeons to whom the above cases belonged for their kindness in allowing this method of treatment to be tried, and for their courtesy in permitting me to publish the results.

EXPLANATION OF FIGURES.

FIG. 1. Chart of visual field of right eye in Case 3, p. 184. In this and in the other figures the central blank space represents the entire field *before* treatment; while the shaded portion represents the *improvement*; the remaining (dark) portion is the blind area.

FIG. 2. Visual field of left eye in above case.

FIG. 3. Field of right eye in Case 4, p. 186.

FIG. 4. Field of left eye in same case.

Fig. 1.

Fig. 2.

FIG. 3.

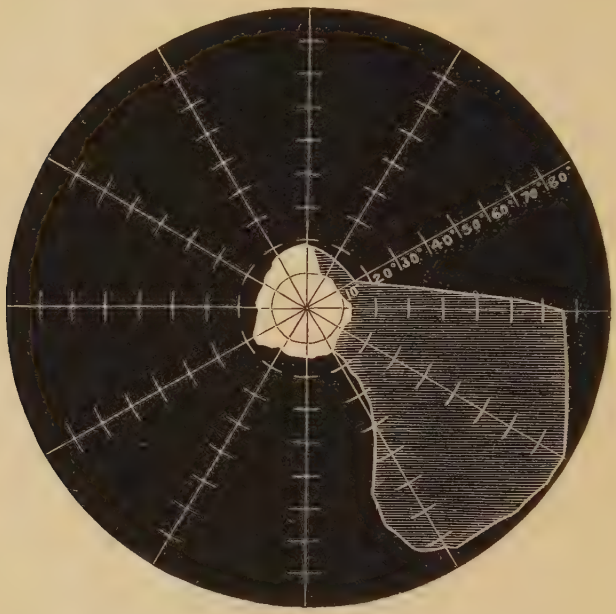
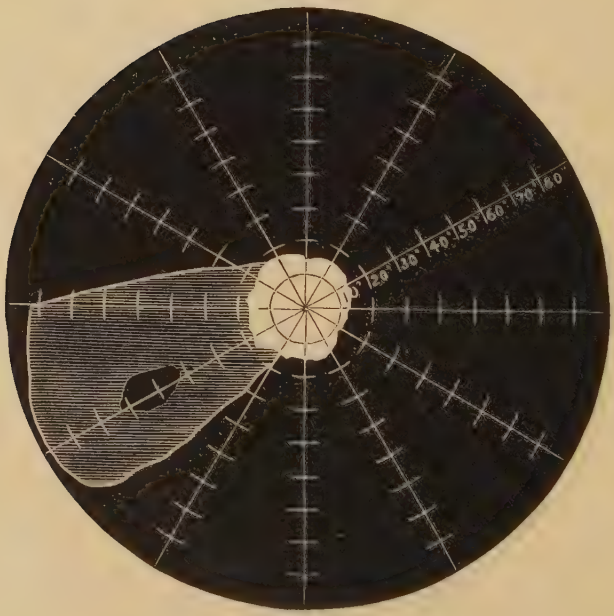


FIG. 4.



THREE CASES OF NEW FORMATION OF BLOOD-VESSELS IN THE VITREOUS.

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The presence of newly-formed vessels, visible with the Ophthalmoscope, in an otherwise fairly healthy vitreous, is a somewhat rare phenomenon; it is remarkable that the three following cases should have been under observation at Moorfields at the same time.

Case 1 was that of a young girl, E. C——, æt. 14. She had squinted inwards with the right eye since early childhood, and had had a tenotomy of the right external rectus done. A year ago she noticed a black thread in front of the right eye. There had never been a blow on this eye, and there was no suspicion of syphilis. Health always good. Menses began at the age of 13, and continued regularly.

She first came to hospital in May, 1880; then in each eye V was equal to $\frac{20}{50}$.

Sphero-cylinders slightly improved her sight, and were accordingly ordered.

She was not seen again till August, 1880, and then the following note was taken:

Right Eye. The margins of the disc are decidedly hazy; vessels enlarged and slightly tortuous; difference between veins and arteries ill-marked. Below the disc is what at first sight appears to be a detachment of the retina, small vessels being seen projecting forwards into the vitreous. On closer examination it is seen that what are undoubtedly true retinal vessels lie a considerable distance directly behind the above-mentioned vessels; so the latter cannot be detached retinal vessels; they are probably vessels of new formation sprouting into the vitreous. They can be traced backwards to the lower margin of the disc; anteriorly they form a succession of

loops (Fig. 1), and seem to terminate near a glistening white mass in the vitreous. The most anterior part of these growths can be seen with + 5 D, the fundus being nearly emmetropic.

Upwards and outwards is seen a white band of connective tissue, crossing the fundus obliquely; it arises from the upper part of the fundus at a point (beyond the limits of the illustration) where it is in contact with the retina, and partly constricts a retinal artery. As it proceeds down and out it lies upon a level a little more anterior; so that it passes slightly in front of a large retinal vessel, which on the distal side of the point where it is crossed becomes much larger and tortuous. A little further down and out this retinal vessel and the band have again come into connexion through the sudden bending down of the former, and at this point five vessels are seen to arise and pass forwards into the vitreous. It cannot be certainly said that they arise from the large retinal vessel, but they certainly appear to do so. A very fine supporting framework of connective tissue seems to accompany them into the vitreous, where they form loops as shown in the drawing (Fig. 1). A largish retinal vessel can be seen some distance directly behind them. Near some of these fine vessels, but without demonstrable connexion with them, are two or three half-transparent round or oval discs, having perhaps one-sixth the diameter of the optic disc. The nature of these is not clear; probably they belong to the framework just mentioned. The most anterior of these vessels just described can be seen with + 6 D. In the neighbourhood of the macula are some traces of old choroiditis.

Left Eye. Fundus emmetropic; margins of disc hazy; veins slightly swollen; summit of disc seen with + 2 D.

The patient was ordered five grains of iodide of potassium three times a day, and to this, after a couple of months, was added a drachm of the solution of the perchloride of mercury. Later moderate doses of calomel and opium were tried, but had to be discontinued, and the former medicine resumed.

The only change at the present time (February, 1881)

after five months of treatment, is that in the right eye the vitreous is much clearer, and the newly-formed vessels proceeding downwards and outwards from the disc appear to have shrunk considerably; in left eye there is no apparent change.

V in each eye is still $\frac{20}{50}$.

The following are the notes of our second case:—

Maud J——, æt. 19. Draper's assistant. First attended as an out-patient in April, 1880, complaining of "dimness of vision." Family history irrelevant. History of iritis dating four months prior to attendance. Before this attack the patient always had good sight and enjoyed good health. She attributed the inflammation of her eyes to catching cold during a menstrual period. No history of syphilis could be elicited.

Right Eye. $V = \frac{5}{200}$. Left Eye. $V = \frac{20}{100}$.

No improvement with glasses.

Right Eye. The cornea was hazy with well marked Keratitis punctata, especially in its lower part. In the lower part of the anterior chamber there was a small deposit of organized lymph, on which a few delicate blood-vessels could be seen by oblique illumination. Colour of iris unaltered. There was almost complete posterior synechia; a small segment of the upper and outer quadrant of the iris responding to instillations of atropia. No reflex from the fundus obtainable. Tension normal.

Left Eye. Cornea clear. A few spots in the lower half of the cornea on Descemet's membrane. Colour of iris unaltered. Dilated fully with atropia. Lens clear. The vitreous was hazy, especially in its posterior part; and this haze was most marked in the neighbourhood of the disc. The retinal vessels, so far as they could be seen, were normal. The outlines of the disc could not be defined, but the central vessels were indistinctly visible. A floating vessel of a pale red colour and peculiar spiral course, about one-third the diameter of the central artery, could be traced forward to near the equator bulbi, then turning upwards and outwards was lost in the vitreous. Neither its point of

origin nor ending could be ascertained owing to the haziness of the media.

Tension normal.

The patient was ordered two grains of mercurial pill twice daily, and the pharmacopœial solution of sulphate of atropine three times a day to the right eye. This treatment was continued for two weeks, when salivation was produced. The number was then reduced to one pill daily, and a gargle of chlorate of potash was given.

At this time there was no improvement of vision; and the objective signs were unchanged. This treatment was persisted in for three months, at the end of which time the vitreous was sufficiently clear to enable a drawing to be obtained, as represented by Fig 2. The largest vessel had its origin from the disc. It came straight forward into the vitreous, and then curved upwards, and could be traced to a point in the retina, where an artery crossed a vein. This point was situated in the equator bulbi above and outwards. The group of smaller vessels sprang from the centre of the disc and they were suspended in the vitreous. The majority of them formed at their anterior extremities a close spiral coil, and then retraced their course to their place of origin.

While under treatment the calibre of these vessels gradually lessened, and by the beginning of December (eight months after the date of admission of the patient) they had entirely disappeared.

During the last three months, and while the patient was taking the mercurial pill daily, five small growths made their appearance on different parts of the iris of the right eye. They were situated for the most part midway between the pupillary and ciliary margins. They were of a greyish-brown colour, grew to the size of a millet seed, and then gradually disappeared.

On January 25, 1881, the following notes were made :—

Right Eye. V = $\frac{5.}{200}$ Cornea hazy. Keratitis punctata and posterior synechia unchanged. No reflex from the fundus obtainable.

Left Eye. V = $\frac{20}{20.}$ The few punctate deposits of Descemet's

Fig. 1.

Fig. 2.

Lith. J. Cook & Hammond, 14th Broadway, Westminster S. W.

membrane unchanged. The media were perfectly clear, so that a complete view of the interior of the eye was obtainable. The fundus presented nothing abnormal, and no traces of the new vessels described were observable.

The third case was brought to our notice by Dr. W. A. Fitzgerald.

The patient was a woman, æt. 51. There was no specific history. She had just ceased to menstruate.

She first came to the hospital in April, 1880, with clots in the right vitreous.

V then was R. E. $= \frac{20}{200}$, L. E. $= \frac{20}{30}$.

She attended from time to time, taking tonics, till December, 1880, when

V was R. E. $\frac{20}{30}$, and with + 3·0 D Jaeg. 1.

L. E. $\frac{20}{70}$, and Jaeg. 16.

On ophthalmoscopic examination of the right eye the appearances were as recorded in the following note :—

The vitreous is slightly hazy. There is no detachment of the retina. Downwards from the disc is a small greyish spot of connective tissue on the retina, from which a bunch of vessels extends upwards and forwards into the vitreous. These vessels correspond exactly with the description given of those in Fig. 72 of Jäger's Atlas. Some present free extremities, while others form closed loops, returning to their place of origin, after having at their most anterior part formed a very fine and close spiral. They float freely in the vitreous, moving with the motions of the eye.

The fundus presents nothing else abnormal except that at the disc, near its lower margin, is a small tag of apparently connective tissue. In the left eye are numerous clots of blood in the vitreous, and no clear view of the fundus is possible. In both eyes tension is normal. Two months later the right vitreous was so hazy that the fundus could not be seen, and on this side V was less than $\frac{20}{200}$.

In left eye at the same date V was $\frac{20}{50}$, and with a concave lens of 1·0 D $\frac{20}{20}$.

There was no albuminuria: no cardiac murmur. The vessels were not specially atheromatous.

We have been able to find only four cases of new formation of vessels in the vitreous visible with the ophthalmoscope hitherto recorded. Mauthner, in an admirable article on this subject,* quotes two. He insists upon only those cases being included in this category, in which the new formation of vessels is the prominent symptom. One of the cases he records was described by Coccius in 1859, and seems to correspond pretty closely with Case 1 of this paper. A full account of the second case, with a plate, is to be found in Jäger's Atlas, Pl. xv, Fig. 72.

This resembles very closely our second case. In both there was the same curiously convoluted bunches of vessels, which Mauthner aptly compares to the microscopical appearance of an injected Malpighian body; and in both the abnormal vessels completely vanished under mercury with complete restoration of vision. In our case there were in addition to the vessels described by Professor Jäger, the large vessel of new formation above referred to, and the curious growths on the iris of the other eye.

Schweigger, in some remarks on this subject,† says that new formation of vessels in the vitreous in eyes, which are blind from choroiditis is by no means uncommon; but, as in these cases the lens and vitreous have generally lost their transparency, such formation can seldom be seen. The cases that Mauthner describes he thinks of a totally different nature; he ascribes them to retinitis, and regards the hyperæmia and loss of transparency of the retina as sufficient evidence of this retinitis. References to two other cases of a

* Lehrbuch der Opthalmoscopie, p. 114.

† Handbuch der Augenheilkunde, p. 417.

similar nature are given by him. These will be found fully described in the "Bericht der Wiener Augenklinik," 1867, pp. 106, 114. In one of these the eye was removed and the connexion of the newly formed vessels with those of the retina demonstrated.

It is worthy of remark that two of the cases described in this paper simulated very closely a detached retina. The diagnostic point, of course, was that some distance directly behind the abnormally situated vessels undoubted retinal vessels could be seen in their natural situation.

It is possible that the true state of things is sometimes mistaken, and cases of new vessels in the vitreous regarded as cases of detached retina. We are indebted to Messrs. Tweedy, Streatfeild, and Tay, to whom these cases respectively belong, for permission to publish them.

Since the above article was written, a case similar to the above has been published in the "Centralblatt für Praktische Augenheilkunde," for February, 1881. It will be found on p. 49, with a sketch.

A CASE OF PRIMARY EPITHELIOMA OF THE LOWER EYELID.

By George Lawson, F.R.C.S.

Surgeon to the Royal London Ophthalmic Hospital, and to the Middlesex Hospital.

The following case is an example of a very rare affection, a primary epithelioma of the eyelid. Epithelioma is occasionally developed from a rodent ulcer in the vicinity of the eyelid, but it is seldom that it attacks the eyelid as a primary disease.

Case.—Thomas B ——, æt. 65, was admitted into the Royal London Ophthalmic Hospital on November 23, 1880, with a primary epithelioma of the left lower eyelid. He said that it began as a small pimple about three months ago; it ulcerated and rapidly increased until it attained its present dimensions, and it was still growing. The ulcer was of the size, and presented the appearance, which is well shown in the woodcut. It in-

volved the greater portion of the margin of the lower lid; it was a distinctly new growth, very solid when felt between the fingers, and could be raised from the subjacent tissues. The margin of the ulcer was hard and rounded, and the whole surface of the growth presented a coarse, ulcerated surface, covered in parts with a thick yellow purulent secretion. There were no enlarged glands to be detected. As there was no doubt about the nature of the growth, I completely excised it, and left an open wound to granulate and cicatrize. The patient did well,

and left the Hospital in November 23, with the wound very nearly healed. The patient has since continued well.

Remarks.—Rodent ulcer and epithelioma are undoubtedly closely allied affections, although rodent ulcer differs in some important respects from epithelioma.

Rodent ulcer does not affect lymphatic glands, whilst epithelioma does, and often at an early stage of the disease.

Rodent ulcer is a rather dry ulceration with only little secretion and no fœtor, and the granulations are small. In epithelioma the secretion from the ulcerated surface is abundant and fœtid, and the granulations large, exuberant, and often in bosses.

Rodent ulcer is confined to the upper part of the face, whilst epithelioma, although it has a preference for certain localities, may under certain conditions attack any part of the body.

The points of resemblance between rodent ulcer and epithelioma are:—

Both rodent ulcer and epithelioma are new growths, composed mainly of epithelial cells; and the new growth is the only part involved in the ulceration. As the growth increases and includes more of the skin and deeper tissues, so the ulceration continues to extend; but the ulceration does not go beyond the new deposit.

On one point I am quite settled, that rodent ulcer, if left, will in time so change its character as to become true epithelioma. I cannot say whether this change is due to a mere progress of the disease, or whether it is that rodent ulcer is peculiarly apt to have superadded to it the characters of epithelioma after the same manner that old standing ulcers, unhealed wounds or scars, or other simple sores, become epitheliomatous.

The following case is an example of a frequently recurring rodent ulcer ultimately becoming a true epithelioma.

I had a female patient in the Middlesex Hospital from whom I removed a typical rodent ulcer beneath the lower eyelid,

The patient soon recovered and left the hospital. It recurred thrice in the space of the next five or six years, and on each occasion I excised it completely. About two years after the last excision, the patient again came back to the hospital, but this time with well marked epithelioma in the same locality. The disease had completely changed its character, it was no longer rodent ulcer, but a typical example of epithelioma.

VOLUNTARY NYSTAGMUS.

By George Lawson, F.R.C.S.

Surgeon to the Royal London Ophthalmic Hospital, and to the Middlesex Hospital.

A short time since a gentleman, after he had consulted me about himself, told me that he possessed the power of shaking both his eyes, and that he had been able all his life to shake them at will. At my request he gave me a performance. First, making both his eyes steady, he then set both into rapid lateral motion, so rapid that the outline of the cornea was completely lost to view. The movements were really an exaggeration of what is seen in lateral nystagmus, but they were so rapid that the margins of the cornea could not be defined.

I have seen another case of voluntary nystagmus in a gentleman who was formerly a House Surgeon in the Royal London Ophthalmic Hospital, but the lateral movements of the eyes were not nearly so rapid as in the case above related. Before setting the eyes in lateral motion, he had to converge them sufficiently to squint, and then he could simulate lateral nystagmus. The movements were completely under his control, and could be started and arrested *instanter*.

A CASE OF SIMULTANEOUS SUB-CONJUNCTIVAL DISLOCATION OF BOTH CRYSTALLINE LENSES, CAUSED BY THE KICK OF A HORSE.

By J. C. Wordsworth, F.R.C.S.

Senior Surgeon to the Royal London Ophthalmic Hospital.

G. W., æt. 68, an agricultural labourer, was admitted in July, 1880. Eight weeks previous to admission, he had received a kick from a horse on his face, by which he was knocked down, and rendered unconscious for a few minutes. The bones of his nose were fractured, and both eyes were ruptured.

At the time of his admission into the hospital, each crystalline lens was lying under the conjunctiva at short distances from the cornea, a little above and to the inner side of its margin; having escaped through a laceration in the scleral coat of each eye, concentric with the upper and inner edge of the cornea. There was a good anterior chamber in each eye; the corneæ were clear, pupils drawn upwards and occupied by dark clots; and the eyes were almost free from pain. In two weeks after admission (during which a drawing had been made of the eyes), he had so far recovered from the injury that the lenses were removed by division of the conjunctiva over them. Little or no irritation followed, and he left the hospital in a few days.

In December he was re-admitted to be examined for glasses, when his vision was as follows:—

R. E. with 10.50 D. V $\frac{20}{20}$ and with 15 D V = Jaeg. 1 at 7″.

L. E. with 10.50 D. V $=\frac{20}{40}$ and with 15 D V = Jaeg. 1, slowly.

In each pupillary space there were still some remains of blood-clots.

A CASE OF GLAUCOMA PRECEDED BY OPTIC NEURITIS, WITH REMARKS.

By L. Webster Fox, M.D., and W. A. Brailey, M.D.

Emma W——, æt. 28. Under care of Mr. Streatfeild. Twelve weeks before attending the hospital she had severe pain in the right frontal region. Two days later, on awakening, she fancied she saw something moving in front of her right eye, and on closing the left, she found that only perception of light remained.

On admission as in-patient, her condition was as follows: left eye H = 1 D. Vision and accommodation normal. Fundus normal. Right eye, no perception of light; cornea clear; good anterior chamber; pupil semi-dilated and sluggish: optic disc scarcely recognizable owing to extreme swelling of it and the surrounding retina; the veins were enormously enlarged and tortuous, and of an inky-black colour; the arteries were about normal. There were numerous large irregular hæmorrhages scattered extensively over the fundus. The neighbourhood of macula was white and opaque. Tension normal. General condition: the patient was a well-developed healthy looking woman. Menstruation regular. No history of rheumatism nor any severe illness. Heart sounds normal. Urine sp. g. 1018; no albumen nor sugar. Her father had had two slight attacks of gout in the great toe, but there was no history of any other hereditary complaint. She remained an in-patient for 18 days, during which time she was treated with mercury and iodide of potassium. She was discharged in the same condition as on admission. During her stay in the hospital she had no pain, and tension continued normal.

On December 24, 1880, she returned. Her eye had become painful; the tension was increased; there was a good anterior chamber; pupil semi-dilated and fixed. One week later the tension was greatly increased (T 3). Indeed there were all the signs of acute glaucoma. No details of fundus were visible.

She was again admitted as in-patient, and treated with instillations of eserine, under which the pupil became semi-

contracted, the tension fell, and the pain was slightly relieved; but after a few days the tension increased again (T 3) and the pain became very severe. Sclerotomy was performed; this reduced the tension, and relieved the pain for a short time. After the lapse of twelve days, tension being again + 3, and the pain very severe, the eye was excised.

The microscopical appearances were generally normal, except that the vitreous contained a few hæmorrhages in its peripheral part. The lens was *in situ*. Microscopical appearances: optic nerve, many large nuclei in its trabecular tissue, more numerous near the eye than farther back. The central vein and artery imbedded in and obscured by a great accumulation of deeply staining nuclei. Only one vessel, probably the artery, discernible; lumen small; walls thickened and much infiltrated with nuclei. Farther back from the eye both artery and vein recognizable and patent, with the walls thickened and slightly inflamed; more so in the case of the vein than the artery. The optic disc was markedly swollen, and the lamina cribrosa pushed back. The retinal veins large, varicose, and enormously distended with blood. The arteries not above their normal size, and of uniform appearance. Enormous numbers of blood corpuscles extravasated, especially in the nerve cell and nerve fibre layers of the retina. The choroid not inflamed, though its veins were distended with blood. The ciliary body: muscular fibres inflamed and atrophied to little more than one-half their normal bulk; arteries enlarged. The ciliary folds atrophied and widely removed from the iris.

The iris atrophied, and the peripheral part adherent to the cornea. A slight excess of nuclei in the cornea. The sclerotic: a slight infiltration of nuclei more marked in the episcleral tissue, and in the walls of its blood-vessels. One enlarged vessel in its course through the sclerotic to the ciliary muscle thickened, surrounded, and blocked by an enormous excess of deeply staining nuclei, quite undistinguishable from those of its walls, apparently a thrombosed and dilated anterior ciliary vein.

Remarks.—The following questions suggest themselves:—

Did this disease start as an inflammation or as a thrombosis? The ophthalmoscopic appearances speak for the

latter, and also, though not very strongly, the suddenly discovered loss of sight.

Against it, and in favour of inflammation, is the precedent pain and, perhaps also, the fact that there is evidence of the independent thrombosis of two veins at points comparatively distant from each other. But if it began as an inflammation causing thrombosis, as, indeed, seems more probable, was it primarily of the optic nerve, extending thence to the ciliary body, or were both invaded simultaneously? We rather incline to the former of these two views.

In our opinion a neuritis caused an acute inflammation of the walls of the central vessels with a resulting thrombosis of the vein. The inflammation then extended forward, especially along the loose episcleral tissue and its blood-vessels, where it found increased expression in the walls of its numerous veins. Passing inwards along the anterior ciliary vein, it set up acute inflammation in the fibres of the ciliary muscle. The enlargement of the arteries of the ciliary body may also be due to the venous thrombosis.

The general condition of the eye, it will be observed, is that of an acute glaucomatous inflammation.

For cases similar in some respects, see the last number of these Reports, Vol. x, page 94, case 395, and Vol. viii, page 9.

Cases in which an embolism of the central artery of the optic nerve of an eye previously healthy has been followed by increased tension have been met with at Moorfields.

CASE OF CYST (CHOLESTEATOMATOUS) OF THE IRIS.

By Simeon Snell,

Ophthalmic Surgeon to the Sheffield General Infirmary, and to the Institution for the Blind.

Frederick C—— æt. 20, from Hoyland, near Barnsley, was admitted into the Sheffield General Infirmary under my care on December 7, 1877.

Eleven months previously he was engaged chiseling a boiler plate when a piece of the metal flew off and struck his left eye. He noticed the particle fall again to the ground. At the time of his admission an opaque line was observed running obliquely across the cornea from its upper and outer margin to rather above its centre. Just behind and somewhat below this scar, in the anterior chamber and on the surface of the iris, was a glistening pearly white elevation; it was about the size of a pea, or perhaps larger, but more oval in form, extending from the periphery of the iris almost to its free margin. It seemed, especially at its external portion, to be in contact, or nearly so, with the posterior corneal surface. The lens was opaque. V = shadows. It would appear that a few days after the accident he could see fingers, and that afterwards his vision improved. Four months before admission, however, sight became worse, and it was then that his attention was drawn to the peculiar appearance on the iris; it was, however, very small at that time.

The right eye was in no way affected.

Operation.—December 10. Under ether the cyst was removed. A broad needle bent at an angle was introduced simultaneously with each hand on each side of the tumour, and on the needles being withdrawn, a Weber's canaliculus knife was passed into the lower opening and gently insinuated between the cyst and the cornea, and being brought out again at the upper incision, the bridge of cornea between the two openings was cut across by it. The piece of iris with the cyst upon it was next seized with forceps and excised. The cyst was removed entire.

Recovery was good, and on January 18th, 1878, it is noted that the traumatic cataract was operated on by the suction curette.

A good deal of opaque capsule resulted after this procedure, and on two occasions was torn through with a needle, some benefit accruing. Subsequently, however, another iridectomy was performed by the side of the former one, on account of the pupil still remaining plugged by capsular opacites. This improved vision, and on June 3rd, 1879, he could read Jaeg. 16 with a + $2\frac{1}{2}$-inch lens.

My friend Dr. Dyson, Physician to the Sheffield Public Hospital, was present at the operation, and kindly undertook to examine with me the cyst, and he made the following report:—

"The cyst when examined more carefully was found to be of a greyish-white colour and had a semi-transparent wall. Though entire, when removed it burst on being transferred to a bottle containing glycerine. Two separate portions were distinguishable; one (probably the anterior wall) was semi-transparent and had some of the contents of the cyst attached to it; the other had a more fibrous and membraneous aspect and was attached to that portion of the iris which was removed by the operation.

"A microscopical examination showed that the *contents* of the cyst consisted of a number of very large clear closely packed cells, like fat-cells, in which no nucleus was discernible; of cholesterine crystals in great numbers; of a large quantity of fatty matter both in the purely granular and oily forms; of pigment cells and granules in small quantity; of sparsely scattered tesselated epithelium and of a homogeneous purely granular material. The delicate anterior wall consisted of homogeneous material pervaded by very fine moderately well defined fibres. The membraneous-looking portion attached to the iris was associated with fatty materials and *débris* similar to those forming the contents; but it consisted mainly of fibres which were more sharply defined, larger in size, and more systematically arranged in bundles than those found in the anterior wall."

Remarks.—Cysts of the iris are of sufficient rarity to put on record the foregoing case, with the description of its structure, and, moreover, the method of operating is of interest. The great majority of cysts are associated with injury. Rothmund collected 37 cases, all he could find recorded, and of these there was a history of injury in 28. Hulke, also, in Vol. VI of these Reports, has described the structure of these

little tumours, and tabulates a series of published cases. He says "in fifteen out of nineteen cases which I have been able to collect, as also in the two now first recorded by myself, as well as that published in this number by Mr. Wordsworth, there was a distinct history of foregoing mechanical injury." After a search, although the period does not thoroughly embrace that which has elapsed since Mr. Hulke's cases were published, I have found 13 additional cases recorded, or including my own, now noted, 14. Out of this number 10 are distinctly described as associated with injury, whilst three are stated to be without "a history of injury," and one is mentioned as having "no cause able to be ascertained."

Removal of the entire cyst, if practicable, appears the correct method of treatment, especially in one of the character described. Needling or removing a portion of the wall of the cyst, as advocated by several authorities, would seem to be more applicable to the serous variety. The mode of operation adopted in the case I have recorded is one which will prove of service in the removal of growths in the anterior chamber, encroaching on the inner corneal surface, and in the present instance almost any other procedure would have been attended with rupture of the cyst. Mr. Carter describes and advocates an almost similar method in his work on "Eye Diseases," and relates a case of sarcoma of iris he successfully removed by it.

SOME CASES OF DIPHTHERITIC CONJUNCTIVITIS.

By James E. Adams, F.R.C.S.,

Assistant Surgeon to the Royal London Ophthalmic Hospital, and Surgeon to the London Hospital.

During the last few years a very considerable number of cases of membranous conjunctivitis have come under observation at the Royal London Ophthalmic Hospital, most of them being of only a moderate degree of severity. They are for the most part characterised by a moderate amount of swelling of lids and of the ocular and palpebral conjunctiva, frequently there is no chemosis at all, and when present it is usually slight. There is a thin opalescent pellicle on the palpebral portion, most marked in the upper lid, uniform in thickness, easily peeled or rubbed off, and leaving a slightly granular or bleeding surface beneath. Frequently only one eye is affected; there is often a history of throat affection in other members of the family or amongst neighbours, though sometimes the most careful enquiry fails to elicit any such facts. The cornea usually escapes altogether, and the disease subsides in from ten days to a fortnight. The usual plan of treatment adopted at Moorfields is frequent and liberal washing with a lotion of sulphate of quinine, the membrane being pulled off as often as it is found to be present at the time of washing. Under this treatment nearly all cases of this moderate degree of severity get well, and apparently this plan is all that can be desired.

Two cases, however, have occurred lately in my practice which have forced the conviction upon me that when the disease occurs in its typical form our quinine lotion is utterly useless, as, indeed, are all other applications that have been tried hitherto.

The first of these two cases was, if possible, the more severe of the two, and reminded one very forcibly of the

graphic description of this disease by our late colleague, Soelberg Wells, a description taken from cases occurring in continental towns where, as is well known, this disease does occur in all its virulence.

The patient, Thomas Donovan, æt. eleven months, was brought to me on the fourth day of the disease. The upper eyelid was immensely swollen, hard, brawny, and the conjunctival surface everted and projecting below the lower one. Its conjunctival surface was not covered by a distinct pellicle, but was mottled with dirty yellow patches interspersed with extravasation, and the only false membrane visible was a little piece in the retro-tarsal fold at the outer angle. The lower lid was affected in a much less degree, there was considerable chemosis, the cornea was hazy and beginning to ulcerate in the centre, and the whole globe was prominent. The extreme tension of the cutaneous surface of the upper lid combined with proptosis gave rise to a suspicion that there might be an abscess, and an exploratory puncture was made deep into the orbit, but no pus escaped. All doubt as to the diagnosis was removed the next day, by the fact of the epithelium of the cutaneous surface of the upper lid peeling off, leaving a surface as though a blister had been applied, and this became covered with a typical false membrane, which was persistently renewed for many days after each removal. This patient was seen daily and treated with the quinine lotion diligently, but no signs of diminution of the disease were visible for ten days. The perforation of cornea took place in the day after the case was first seen, and the globe became subsequently quite shrunken. No history of direct contagion could be obtained in this case, nor did it appear that the disease was propagated by the patient to any other persons.

The second case was apparently much milder as far as the amount of swelling of lids was concerned, but the appearance of the membrane on the palpebral mucous surface was quite characteristic and there was a good deal of chemosis. The patient, a little girl about eight years old, was treated as an in-patient, and at the time of admission the cornea was entire and bright. The quinine lotion was diligently used, but the disease appeared to increase steadily, and the cornea ulcerated and perforated, and it was not until about the twelfth day that the

false membrane ceased to form, leaving the lids very granular and they remained so for several weeks.

A sister of this patient developed a mild attack of the disease which yielded speedily to treatment.

To those who have seen this disease in towns where it is frequent, and it is alleged to have occurred in this country, in Manchester, the above cases may appear uninteresting and commonplace, but they are the only examples of this disease that have come under my observation in thirteen years' hospital out-patient practice, and I have direct assurance from ophthalmic surgeons to other hospitals of similar experience.

It is to be regretted that fuller details of the constitutional condition of these patients is absent, but the following questions suggest themselves. Do patients ever manifest any paralytic phenomena either of eye, throat, or limbs after diphtheritic ophthalmia? And is the presence of albumen in the urine frequent either during or after an attack?

I should mention that I, in common with the rest of the profession, am entirely indebted to Mr. John Tweedy for the suggestion of the quinine lotion for these cases, and the recording of the above cases is not intended to imply that his treatment is not the best at present known. I was not aware until after writing the above that his papers in *The Lancet* for January 24, and February 21, 1880,* contained a description of a case as typical as those recorded here successfully treated after his plan; and if another case occurred to me I would follow again this course, perhaps more energetically.

* "On the treatment of Diphtheritic Conjunctivitis by the local application of Solution of Sulphate of Quinine, by John Tweedy, F.R.C.S."—*The Lancet*, 1880, vol. i, pp. 125 and 282.

ON SOME UNUSUAL FORMS OF IRITIS.

By J. E. Adams, F.R.C.S.

About three years ago I mentioned in a communication to the Hunterian Society three cases of iritis occurring in young girls about the age of puberty in whom I was utterly unable to find any dyscrasia to account for the occurrence. Two out of the three happened in private practice, and I became acquainted with the personal history of the parents and brothers and sisters in great detail, and no history of gout, rheumatism, or syphilis could be reached. All three patients were types of childish health and beauty, and the characters of the disease were identical in all. It is characterised by an abundant effusion of lymph producing firm posterior synechiæ, a total absence of pain or photophobia, and great injection not limited to, or visibly intensified at, the ciliary region, and involving the conjunctiva so that one and all had passed for some time while under treatment by the medical attendant as cases of conjunctivitis. The disease subsides apparently of its own accord, leaving the eye scarcely at all impaired; two having $V = \frac{2}{20}$ and Jaeg. 1, and one $\frac{2}{40}$. They were all unilateral and on the left side. Recently another precisely similar case has occurred. In this case there are decayed teeth in the upper jaw on the same side, but in the other the teeth were good.

Another very remarkable case of iritis occurred in a patient, a gentleman twenty-nine years of age, free from gout, rheumatism, or syphilis, but living in a marshy country and subject to intermittent fever. At the time of observation his left eye, for which he consulted me, showed marked ciliary redness, though the pupil was active, and the media clear. $V = \frac{2}{20}$. Spots of uveal pigment on right capsule.

In a few days a few posterior synechiæ were revealed in the left under atropine. Ordered atropine and iodide of potassium. After the lapse of a week he was worse, complaining

of considerable pain, which he said was always worse at two o'clock in the morning.

This periodicity was so marked that the conviction that some miasmatic influence was at work was forced upon me, and I prescribed quinine, with the result that immediate relief was obtained, and the eye assumed its normal appearance in a week. Since then (now four years) he has had one or two slight relapses, but timely doses of quinine have always brought the complaint to a speedy ending.

HOUSE SURGEON'S NOTES.—TREATMENT OF IN-PATIENTS.

By G. Herbert Burnham, M.B.,

Senior House-Surgeon.

Use of Carbolic Acid Lotion in Gonorrhœal Ophthalmia.

Being desirous of testing the curative power of the above mentioned lotion in this variety of ophthalmia, I was allowed to do so in the following cases, through the kind permission of the surgeons.

Elizabeth H—— æt. 21, admitted under the care of Mr. Lawson, became an in-patient in June, 1880. On admission the condition of the left eye was as follows:—The lids were much swollen, brawny, and so tense that the upper lid was everted with much difficulty, and then not fully; the ocular conjunctiva chemosed and overlapping so extensively the cornea that its margins could not be seen, though several attempts were made. There was also a copious purulent discharge. The cornea as far as visible, was unimpaired. The right eye was also affected, but not nearly so severely, and never equalled the other in intensity. The patient had light, flaxen hair, a thin, pale skin, and was decidedly anæmic looking, in fact, presenting the appearance of a person of by no means vigorous habit of body.

The treatment pursued was the frequent and free use of carbolic acid lotion, one part of the acid in twenty parts of water, and cleansing with iced water. The mode of application was as follows:—On admission, the lids were everted and thoroughly bathed with the lotion; the girl was also ordered to keep the eyes clean by means of the iced water, and to apply every half-hour, at least, the lotion to the eyes. In addition, I applied the lotion to the everted lids twice daily, and the nurse four times during the twenty-four hours. In twelve hours improvement was visible. As at the end of forty-eight hours the improvement still continued, and the eye-lids smarted, I ordered that she herself should use the carbolic acid solution (one in forty), the stronger solution (one in twenty) being still continued by myself and the nurse. The constant use of the one in twenty solution was soon returned to, as the conjunctival chemosis

was again increasing, as also the discharge. The free application of the above treatment was kept up for one week longer, being comfortably borne, when she was allowed to use the weaker solution a portion of the time. The girl was discharged one month from admission almost completely cured, that is, the discharge was almost nil, and the appearance of the eyes normal, save a little injection. When seen on subsequent occasions, the cure seemed permanent.

Note.—The carbolic acid lotion must be thoroughly applied, at least six times in the twenty-four hours, to the everted lids, bathing them with it as freely and unsparingly as with water; and the patient must also be taught to hold the lids well apart when using the lotion, and also to keep up the application during the night time. The use of the lotion is followed by smarting, not at all severe, and a feeling of warmth in the eye, both of which disappear in a few minutes. The cornea in this case continued throughout healthy. When the disease is still severe, the constant use of the one in twenty solution is necessary, as witnessed in the increased conjunctival chemosis under the use of a weaker solution.

A second case, a young man, was admitted a short time ago under the care of Mr. Wordsworth, in which the same treatment was followed throughout. In this case, though the swelling of the lids was not as great, that of the ocular conjunctiva was as marked, and also more firm and fleshy. On his admission there was in one eye a deep and large excavation of the cornea with slight infiltration of the margins, and falling forward of the iris against its posterior surface. The excavation began very quickly to improve. The improvement was as decided and almost as rapid as in the first case. The lotion (one in twenty) was freely used throughout, that is, a pint or so was poured into a dish, and then the everted lids were freely bathed with it by means of absorbent wool. In addition, at least every half-hour during the day-time, and many times during the night, the patient used it thoroughly, in so doing keeping the lids well apart and the head tipped a little backwards, so as to allow free ingress.

The third and last case was that of a young man, also under the care of Mr. Wordsworth. On admission, the swollen lids on being everted exposed the palpebral conjunctiva, much thickened and spongy looking; the ocular conjunctiva was very much

swollen, lying in great folds, overlapping the cornea so much that its central third only could be seen, and the edge of an excavation could be just perceived. The discharge was very abundant. The right eye, being unaffected, was covered with Buller's eye-shield.*

As in the other cases, improvement was soon noticed; and in twenty-four hours the conjunctival swelling had so gone down, that the greater portion of the cornea, with a deep excavation at its upper part, could be seen, only, however, when the eyeball was moved in different directions by the patient, as, when at rest, the conjunctiva overlapped. At the end of seventy-two hours the following note was made: The whole cornea is now visible; there is seen a deep excavation of the upper third, the edges of which are just beginning to lose their sharply defined outline. The rest of the cornea is normal looking. A day or so later small vessels were making their appearance on the excavation; and the whole eye looked so well, that all danger of the giving away of the cornea was thought to be passed. At the end of eight days the progress was still as satisfactory in every way. The treatment was the same in every particular as in the case of the other young man.

Remarks.—In regard to the first case, subsequent experience seemed to show that improvement would have been more rapid if the one in twenty solution had been used throughout.

In the second case, the condition of the patient at his discharge, eighteen days after admission, was as follows:—The lower iris still in contact with the cornea; no tendency of the corneal excavation to bulge, in fact, daily looking less likely to do so; the upper part of the chamber normal in depth, and the corresponding cornea perfectly clear; the lids were but slightly gummed together after several hours sleep.

The condition of the third patient, fourteen days after admission, when he was discharged, was as follows:—No swelling of the lids: their conjunctival surfaces quite normal in appearance; the ocular conjunctiva still injected, and

* The Lancet, May 16, 1874, and in Mr. Lawson's Manual, 4th Ed., p. 10.

slightly thickened towards the outer canthus. The cornea was quite clear below; at the upper part was the healing excavation, freely supplied with numerous small vessels running along its floor. The anterior chamber was normal in depth. After sleeping several hours, the lids were but slightly stuck together.

In carbolic acid lotion, in the form of a *strong solution*, we seem to possess a powerful and convenient remedy for Gonorrhœal Ophthalmia. It gives the patient but little discomfort, and exercises a marked astringent as well as antiseptic influence, together with a beneficial action on the cornea, especially in cases in which there are more or less advanced semi-transparent excavations, so often ending in perforation, or even destruction of the cornea, under other modes of treatment.

No. II.

Corneal Infiltration with Hypopyon.

Three modes of treatment were applied to these cases. Some cases were treated with eserine (gr. ij ad. ʒ i.) instilled four to six times daily, and by frequent bathing with decoction of poppies. If there was much pain, leeches (generally two at a time) were applied to the temple of the affected side. Internally, sulphate of quinine was administered in two-grain doses three times a-day.

In other cases, there was added an operative procedure to the above treatment. This consisted in making an incision with a Graefe's knife along the entire width of the base of the ulcer and through the thickness of the cornea. In those cases in which the puro-lymph did not come away from the anterior chamber with the gush of aqueous, it was coaxed out, or if too thick to flow, was pulled through the opening by small forceps. The removal of the pus from the anterior chamber, especially if it were thick, appears to have increased the beneficial effect.

The last form of treatment to be mentioned was the

instillation of atropine drops three times daily, frequent bathing with belladonna fomentation and quinine internally.

In corneal infiltration with hypopyon, the corneal incision through the base of the ulcer, with subsequent eserine treatment, seems to give the most satisfactory results. Where the corneal infiltration is small and the hypopyon slight, the eserine, or first mode of treatment, was alone used, as improvement took place rapidly; but in cases in which the extent of each was considerable in amount, or seemed actively increasing, the corneal incision in addition certainly gave the impression of accelerating the rapidity of healing.

In comparing the cases treated with eserine, with those treated with eserine and corneal incision, and selecting from each those which closely resembled one another, operative interference seemed not only to hasten a favourable result, but also to lessen the size and denseness of the corneal cicatrix.

With atropine, the progress towards a favourable termination was slower, the tardiness of the healing process exhibited being in marked contrast to the activity shown under eserine.

The rapidity of the beneficial effects of eserine was very marked in those cases of infiltration of the cornea with but little, if any, conjunctival injection. It would seem that in these apathetic conditions it proves itself superior to atropine, not only by its quicker healing power, but also by giving a more sharply defined boundary to the infiltration. Transparent excavations of the cornea were also most satisfactorily influenced by it, the sharply defined edge soon becoming rounded. In some cases the corneal incision has been repeated in different places with advantage. The necessity of the repetition arises by reason of the infiltrations being isolated, and hence there is an inability to deal with more than one at a time. It has been observed that in such cases the infiltration so tapped has more rapidly healed than the other not so treated; and that the incision of the second was followed by equally good result. Sometimes the opening of the incision once a day for a few times is beneficial, especially in cases in which a reforming of the anterior chamber is

accompanied by hypopyon, coming to all appearances from the same place as at first, that is, where the incision was first made.

The danger of an anterior synechia is very slight, if after the performance of the incision a firm compress bandage be applied to the eye for about ten hours, as by this time, if the bandage be left undisturbed, the anterior chamber has reformed. In some few cases in which the incision was opposite the margin of the pupil, the instillation of atropine once or twice dilated the pupil sufficiently to drag it away from the opening; as soon, however, as the chamber is of some depth, eserine is to be resumed. It may be that there is also less tendency of the iris to adhere to a wound through tissue so infiltrated.

May not the action of eserine in these cases be partly explained by its powerful effect on the accommodation of the eye, calling it into greatly increased activity, and thus bringing about an unusually large vascular supply to parts in close vicinity to the cornea, in this way giving to the cornea a greater supply of blood from which to draw sustenance? The often repeated instillation, by keeping up continually the spasmodic condition, retains without intermission the heightened vascular supply. From this continuance there results a brighter corneal lustre, and also at times the presence on the cornea of vessels so minute that they can only be seen by oblique illumination and using a second lens as a magnifier.

In cases in which there are much photophobia and conjunctival injection associated with the corneal mischief, atropine often acts better than eserine, as here it gives the needed rest by paralysing the accommodation.

If iritis be present, eserine is generally regarded as contra-indicated, the beneficial effect of the eserine not being then as marked as without the iritis, while it gives a small pupil more easily bound down by adhesions. Atropine does away with this danger to a great extent, and seems to have as great curative action on the corneal affection as the eserine, and

in some cases greater. In a few cases, in which iritis did not seem to be present at first, unsatisfactory after-progress with eserine was found to be associated with iritis, as the pupil did not under atropine assume either its full or normally round dilatation. Under atropine, however, improvement began and steadily progressed. In a few cases of corneal infiltration with some conjunctivitis either with or without iritis, the solution of carbolic acid (one in twenty) has been used with such good effect, that further trials are being continued.

No. III.

Entropion following Granular Lids; Treatment by Bürow's Operation.

THE entropion arising from the cicatrices of old granular lids has been treated with good results by Bürow's operation. This, as practised at Moorfields, consists in making an incision along the inner surface of the lid, through the entire thickness of the cartilage of the upper lid, into the muscular and areolar tissue, following as a guide the cicatricial line which is usually seen running along the conjunctival surface, near to the free border of the lid, from almost the outer to the inner canthus.

The operation is begun by everting the upper lid on a small spatula, resembling a diminutive shoe-horn, which is kept behind the lid when so everted. The lid being held in position on the horn by the index finger, an incision is made in the cicatricial line, and extending, when completed, from well up to the outer canthus to close into the inner, and through the entire thickness of the cartilage, leaving intact, however, the integument of the lid. The horn being pressed firmly down into the groove caused by the everted lid, and the latter pulled as far up as possible on it, not only lessens the bleeding, but also causes the incision to gape, and thus enables one to see when the cartilage is

almost divided, giving in this way an indication for cutting cautiously so as to avoid injuring the integument.

Another way of doing the operation is to make a small incision through the cartilage of the everted lid from the conjunctival surface about the centre, and then, passing one blade of a pair of scissors through the hole, to slip the blade along between the skin and cartilage, and then on closing the blades the cartilage included between them will be divided. This division should follow the same direction as that mentioned above, and be as complete.

In this operation it seems necessary, for a perfect result, to leave no bridge of cartilage undivided, to extend the incision well up to each canthus, to have the cicatricial line well-marked, and to follow it accurately in making the incision. When the section has been made, the edge of the lid with the lashes should lie in a normal position, and a blue line caused by the extravasted blood should be seen through the integument corresponding to the incision in the cartilage.

This operation has been often done, and in a number of cases, extending over several years, has been attended with most satisfactory results. In some of the earlier cases the after-effect was slight; but experience seemed to prove this to have been due to want of thoroughness in the performance of the operation. It is perhaps not advisable to perform the operation till the cicatricial line is well marked, as failure in some of the early cases may have been due to making the incision in a wrong position, owing to the absence of the guide afforded by the cicatrix.

As the keeping of the lid in the proper position on the horn with the index finger, is not only tiresome, but also sometimes difficult, owing to the contracted condition of the cartilage, I have devised an instrument (see fig.) to alleviate the inconvenience. It consists of a horn, similar to the one used with the finger, and a movable metallic bar fastened to the horn, and so contrived as to take the place of the finger, both in freedom of move-

ment and power of holding the lid in position. Towards one end of the horn a slit is made, and through this there passes

a screw, not only securing one end of the bar, but also enabling it to be fastened in any part of the slit, so as to regulate the position of the other end. This screw is usually left loose, so as to give freedom of movement to the other extremity in any desired direction. The free end, which is to grasp the upturned lid, is toothed and also bevelled, so as to allow a better view of the exact position of the teeth, and hence admitting the cartilage to be grasped close to the free border, and at the same time firmly. This is practically of importance, because the surface between the cicatrix and the free edge is sometimes very narrow, and if the cicatricial line is to be closely followed as a guide, it ought not to be encroached upon. The widened part of the bar is for the tip of the finger to rest upon, and is roughened to afford greater security of grasp. A spring is placed beneath, so as to allow of quick and easy elevation of the toothed extremity.

The central part of the cartilage corresponding to the width of the horn is first completely divided; and then, by shifting it to one end of the lid and then to the other, the division of the whole cartilage is easily completed. The lateral movement of the serrated end is now of use, as a firm hold can be taken of the cartilage at each end of the lid. The knife used to make the incision with is a Sichel's or a Beer's. The instrument has been made for me by Weiss and Son.

CURATOR'S PATHOLOGICAL REPORT.

By W. A. Brailey, M.D.

Tumours of the Eyeball or Orbit: 28 *cases.*

ese are classified into A. Tumours not encroaching upon the Cavity of the Globe. B. Intraocular Tumours. These last comprise (*a*) 13 cases of Sarcoma of the Uveal Tract and (*b*) 10 cases of Retinal Glioma.

A.—*Tumours not encroaching upon the Cavity of the Globe:* 5 *cases.*

No. 548. Mary G., æt. 62. Under care of Mr. Lyell. A rounded unpigmented tumour grows from the inner sclero-corneal junction of her *Right* eye. It is the size of a large bean and overlaps the cornea by its anterior thin edge, as well as the sclerotic by its posterior thicker part. The globe looks otherwise	Tension normal. Posterior arterial circle in ciliary body is slightly enlarged. The anterior is about normal.	A small round-celled sarcoma is found in the deeper layers of the sub-conjunctival tissue, being in contact with the proper scleral and corneal tissues on the one hand, but separated on the other from the conjunctival epithelium by the unaffected superficial loose connective tissue web. It extends back for some distance as a thin layer in the episcleral tissue, besides overlapping the sclerotic behind and the cornea in front. The unchanged epithelium of the conjunc-	The ciliary folds are not shrunken. The most anterior of them show some some slight nuclear increase. The ciliary muscle is of good size and shape, and its fibres are slightly inflamed. There is a general increase of nuclei in the episcleral tissue, especially near the tumour, and a slight similar change in the tissue of the sclerotic and cornea. The papilla is slightly swollen, there is some excess of nuclei in it, which appears to be in the walls of fine blood-vessels.	.. ..	The changes in the O. N. are more conspicuous than those in the ciliary region. Six months after the excision of the globe, there was no recurrence. Six months later she returned with the orbit filled with a firm mass of tumour.

A.—*Tumours not encroaching upon the Cavity of the Globe*—continued.

No. 548.—*continued.* healthy as far as concerns its exterior. The pupil is round and mobile. Near vision = J. 6. The eye waters very much. The tumour has been removed twice; The last time a year ago.		tiva can be traced continuously over it.	There is an increase of nuclei in the connective tissue of the anterior part of the nerve and increased connective tissue in the nerve further back, most developed in relation with the blood-vessels. There is no evidence of any inflammation in the retina, nor of any proceeding back along the choroid from the ciliary region to the papilla.		
No. 388. Edward T., æt. 60, under care of Mr. Streatfeild. His *Left* eye presents a darkly pigmented sarcoma the size of a small bean, growing on its external surface at the sclero-corneal junction of the outer side. Its	Tension normal. Arteries of ciliary body slightly enlarged in the neighbourhood of the tumour. Elsewhere they are normal.	The conjunctival epithelium can be traced completely over the tumour which is constituted by an infiltration of the sub-conjunctival tissue by cells which are ·1 mm. wide and drawn out at each end into a short tail. Their broadest part is constituted by a large staining nucleus with a narrow external zone of	The ciliary body and iris, where they are nearest to the tumour, are a little inflamed, the muscular fibres more especially. The ligamentum pectinatum is slightly inflamed but not contracted. The ciliary folds are of good size. The periphery of the anterior chamber of the aqueous is of fair depth.	.. ..	.. ..

A.—*Tumours not encroaching upon the Cavity of the Globe*—continued.

No. 388.—*continued.* surface is marked into rounded lobules. It was first noticed as a red spot 10 years ago.		protoplasm. The adjacent episcleral tissue contains numerous round nuclei which are only half as large. These become more rare as we pass into the sclerotic, from the corpuscles of which they become indistinguishable. No tumour cells are found anywhere else.	The canal of Schlemm is large. The ciliary body and iris, where they are farthest removed from the tumour, are in a similar condition, though their arteries are scarcely at all enlarged. The O. D. is not swollen. There is slight but distinct inflammation of the connective tissue in the nerve trunk. The episcleral tissue has its nuclei somewhat increased.		
No. 56. Joseph B., æt. 60, under care of Mr. Hulke. There is an epithelial growth at the outer sclero-corneal region, which was first noticed 4 years ago. Several ineffectual attempts have been made	Tension probably normal, but globe extremely tender. The ciliary arteries are a little enlarged in the ciliary body near the tumour.	The conjunctival epithelium is thickened, gland-like extensions from it run down into the loose sub-conjunctival connective tissues like solid columns of cells running in various directions, which are cut in the sections at all sorts of angles. The episcleral tissue is loosely infiltrated with small round cells,	There is slight but distinct inflammation of the connective tissue of the O. N., and of the fibres between its inner and outer sheaths. The ciliary body is inflamed, especially its muscular fibres, as is also the iris. There is a little atrophy of both. The ciliary folds are small and not advanced. The peri-	The sclerotic presents a slight nuclear increase, especially in its outer layers and in the walls of its blood-vessels. This is especially seen in the	.. ..

A.—*Tumours not encroaching upon the Cavity of the Globe*—continued.

No. 56.—*continued.* to remove the growth previous to the excision of the eye.		some of which are multinuclear.	phery of the anterior chamber of the aqueous is shallower than normal, but the cause of this is not apparent with certainty, though the ligamentum pectinatum appears a little inflamed and somewhat contracted.	sub-conjunctival tissue.	
No. 577. Edward L., æt. 18, under care of Mr. Adams. Proptosis of *Right* has been noticed 5 months. *At excision*, the vision is perfect (= $\frac{6}{6}$ and J. 1). The O. D. looks normal.	Tension normal. The arteries of the ciliary body are a little enlarged.	There is a tumour behind the eye of doubtful origin. Its connections appear to be with the periosteum. It had to be removed in fragments which were firm and yellowish-white in colour. The tumour is made of a firm, fibrillated tissue containing many nuclei, mostly elongated. There are, however, small areas in the midst of the fibrous tissue where the nuclei are all round and so abundant as to nearly replace altogether the fibrous tissue and give	The O. N. presents a slight increase in the fibrous tissue of its trabeculæ and in their nuclei and blood-vessels. The papilla is a little swollen at its margins. The ciliary body and iris are very slightly inflamed, especially their muscular fibres, but not atrophied. Indeed the connective tissue internal to the muscle is scarcely at all affected. The ciliary processes are enlarged and advanced a little so that the peripheral part of the	.. ..	The patient died from a recurrence in the orbit 2 months later.

A.—*Tumours not encroaching upon the Cavity of the Globe*—continued.

No. 577.—*continued.*		the appearance of a small round-celled sarcoma. The blood-vessels are not very numerous.	anterior chamber of the aqueous is rather shallow. This might be due to the pressure of the ciliary folds on the iris. The canal of Schlemm is of good size, and the ligamentum pectinatum very little if at all contracted.		
No. 570. Samuel C., æt., 65, under care of Mr. Lawson. The *Left* eye has been pushed forwards for 4 weeks only. The cornea is clear, the anterior chamber of good depth, the pupil dilated and inactive. There is no *p.l.* The ophthalmoscope shows decided swelling of the papilla.	Tension very slightly increased at excision. He says it has been harder at an earlier period. Arteries of ciliary body enlarged, especially its posterior circle. The circulus major is surrounded by	A sarcoma, made for the most part of small round cells deeply staining throughout, is found attached to the outer nerve sheath, though it is not clear that its only connections are with this. It gradually blends with its fibrous tissue.	There is decided hypertrophy of and connective tissue increase in the fibrous frame-work of the O. N. Its nuclei are also increased in number. The ciliary body is considerably inflamed, and its muscular bundles are very atrophic. The iris is slightly inflamed and somewhat atrophied. The peripheral part of the anterior chamber of the aqueous is obliterated by the application of the peripheral part of the iris to the outer-	The tumour recurred in the orbit shortly after excision of the eye. Tumour cells were found in the glands of the neck and in the liver. The pia mater all over the brain was minutely injected. There	His urine was not examined, but there was no reason to suspect renal disease.

A.—*Tumours not encroaching upon the Cavity of the Globe*—continued.

No. 570.—*continued.*	an excess of nuclei.		most or most posterior part of the ligamentum pectinatum. The ciliary folds are much distended with enlarged capillaries. They are probably larger and more advanced than normal. The episcleral tissue is inflamed, especially near the sclero-corneal junction. There is no disturbance of the pars ciliaris retinæ or of the vitreous body. The retinal arteries have their walls enormously thickened with the "hyaline fibroid" change which affects its entire coat, except the innermost layers. There is a slight nuclear increase in the choroid generally.	was lymph effused over the anterior two-thirds of the upper surface of the brain. The increase of nuclei in the episcleral tissue extends all the way from the O. D. to the ciliary region. It is greatest in front. There is also a slight increase in the sclerotic and cornea generally.

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of Uveal Tract.* 13 *cases.*

No. 580. James L., æt. 52; under care of Mr. Lawson. Dimness was noticed in his *Left* eye 17 months ago. 13 months ago his retina was detached at its upper and inner part; the pupil was inactive; there was occasional pain. He read J. 19 only at 12″. *At excision*, the cornea was clear, the pupil large and round. There was no *p.l.*	Tension slightly diminished but not to minus 1. The circulus arteriosus iridis major is a little above average size.	The tumour fills half the cavity of the globe projecting as a rounded mass from the inner part of the choroid. It overhangs the O. D. behind, pressing together the 2 folds of the retina, and in front extends beyond the equator. The cells of the tumour are spindle-shaped, and rounded lumps of brown pigment are scattered among them. The few blood-vessels that are met with have very thin walls which do not appear to be surrounded by a sheath space. The tumour is probably derived from the middle and outer layers of the choroid, for the chorio-capillaris can be traced for some distance unchanged over its internal surface.	The ciliary body and iris are slightly inflamed, but not at all atrophied. The ciliary folds are large and somewhat advanced, so as to be very near to the iris which in its turn is very near to the cornea, thus rendering shallow the peripheral part of the anterior chamber of the aqueous. The ligamentum pectinatum is a little inflamed. There is slight optic neuritis, *i.e.*, the connective tissue framework of the nerve is somewhat inflamed. The retina at the papilla is pushed aside, and atrophied on account of the presence of the tumour.	There is an excess of small staining nuclear bodies in the part of the sclerotic adjacent to the tumour, which condition extends to a less degree all the way to the O. D.	3 months later there is no recurrence. The Right eye, however, is weak and irritable.

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of Uveal Tract*—continued.

No. 293. Emma T., æt. 42; under care of Mr. Adams. The vision of her *Right* eye has been noticed to be defective for 3 years. *At excision,* the cornea was clear; the ant. chamber of fair depth; the iris a little thickened and discoloured. The pupil dilated circularly with atropine. There was doubtful *p.l.*	Tension as above. Arteries normal.	A rounded firm tumour, the size of a hazel nut, with a slightly lobulated surface projects from the choroid of the posterior part of the globe, and overhangs the O. D. Its central part is mottled with pigment. The retina generally lies *in situ.* It is adherent closely to the summit of the tumour.	The ciliary body and iris are a little inflamed, but of good size and shape. The ciliary folds are large, and may be a little advanced, though clearly removed from the iris, whose peripheral part is a little nearer the corneal margin than usual. The canal of Schlemm is very well seen. The ligamentum pectinatum may be a little contracted. There is slight inflammation of the nerve trunk as above. The tumour has the same structure and relation to choroid as in the case above (No. 580). It is, however, much more vascular than that, and contains very little pigment.	.. ..	No answer was returned by the patient or her friends to a subsequent enquiry.

No. 313. Lucy S., æt. 13, under care of Mr. Adams. The *Left* eye was noticed to have something wrong with it 3 months ago. *At excision*, there were 2 yellowish nodules on the anterior surface of the lower part of the iris, very like to syphilitic gummata in appearance. There were point-like posterior synechiæ especially at the lower pupillary margin.	Tension slightly diminished as above. Arteries normal.	The lower limb of the iris is vastly thickened, except at its apex, into a tumour whose anterior border is close to the posterior corneal surface. The tumour is made of small round cells which are supported by a fine imperfectly fibrillated reticulum, with very rare blood-vessels. At points, the cells are more closely clustered, and less deeply stained, forming denser rounded nodules in the tumour mass. Similar rounded lumps are scattered through the otherwise uninvolved ciliary muscle. Some of the ciliary folds are distended with similar cells. A few similar rounded masses of cells are found in the ciliary body, even where it is farthest removed from the tumour.	The iris and ciliary body are a little inflamed, but not at all atrophied. Indeed at the lower part of the ciliary circle, the ciliary body is thickened by the swelling of it, and the ciliary folds from the presence of tumour cells, so as to be nearly double its usual diameter. The iris is thickened many-fold. The optic disc is a little swollen, and contains many fine blood-vessels. There is very slight excess of nuclei in the nerve-trunk. The lens is *in situ*. The space between the lens and ciliary body below, as also the lower part of the anterior chamber of the aqueous, are nearly, if not quite, obliterated.	The tension is even below the normal, notwithstanding the obstruction at the circumlental space, and at the entrance to Schlemm's canal.	The patient is healthy-looking. There is no family history which can throw any light upon the case. Sometime afterwards, however, her friends report that she has become the subject of pulmonary phthisis.

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of Uveal Tract*—continued.

No. 375. Annie C., æt. 19, under care of Mr. Adams. The outer part of the field of vision has been noticed to be defective for 9 months. *At excision* V = $\frac{20}{20}$ barely, and Jaeger 1. The pupil dilates round with atropine. The anterior ciliary arteries, as seen on the exterior of the globe, are much distended.	Tension normal. Circulus arteriosus major perhaps a little above average size in places.	A large rounded darkly pigmented tumour projects from the inner surface of the ciliary body into the cavity of the vitreous. It is made principally of dark brown spherical pigment masses of enormous size (·022 mm., after the hardening of the preparation in Müller's fluid and alcohol), which are in some places aggregated by themselves loosely into groups, whereas in others they have intermixed with them, some smaller cells (·01 mm.) with distinct small nuclei. There are also sometimes small lighter coloured pigment cells, and a few nuclei which appear to be free. There is no stroma other than that formed by the few blood-vessels, and in places the remains of the structure of the ciliary muscle. The capillaries are large and thin-walled.	The ciliary body at the inner part of its circuit is enormously thickened at its posterior part by the tumour, its anterior part is tilted forwards, so that the iris periphery is very near to the cornea. Still the canal of Schlemm is visible, and access to it is possible, except at one point where the meshes of the ligamentum pectinatum are invaded by pigment cells. The iris is inflamed. Further from the tumour the iris and ciliary body are somewhat inflamed. There is no atrophy of either. The ciliary folds are decidedly large and near to the iris, which is nearer to the cornea than normal. The optic papilla is somewhat swollen, and contains very many fine blood-vessels. There is distinct, though slight, neuritis of the nerve trunk.	The sclerotic near the tumour contains a decided increase of nuclei which extends all the way, especially in the walls of its blood-vessels, to the optic disk.	There was no recurrence. At the extreme margin of the tumour there is seen simply an increase in the size and number of the pigment epithelium cells on the internal surface of the ciliary body. Nearer its centre, large round pigment cells appear in the space between the ciliary body and sclerotic. Nearer to the tumour - centre the two sets of pigment cells are continuous, and

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of Uveal Tract*—continued.

No. 375.—*continued.*		The arteries have no sheath-space surrounding them.			they extend forward for a considerable distance between the fibres of the ciliary muscle destroying its structure.
No. 612. M. B., æt. 84. *Right* eye excised and presented by Mr. Bowman. 13 weeks ago there were incipient cataracts in both eyes. The *Right* had T. n.; and very dull fundus reflex, the outer part of the field was wanting. J. 8 was read badly at 6″ with + $\frac{1}{60}$. *Four weeks* later the eye had	T. very much increased (T. 3). Arteries forming the posterior ciliary circle much enlarged. Little if any enlargement of the anterior circle.	The retina lies detached in loose folds. A sarcoma projects from the inner equator into the cavity of the globe, as a thickening of the choroid. Its most anterior part, which is steep with rounded summit, is 7 mm. high, and overhangs its base somewhat, but the ciliary region is not nearly reached by it. Behind it shades off gradually into the normal choroid on the outer side of the O. D. The tumour is made of cells,	There is great atrophy of the ciliary body, especially of its muscular fibres, as well as a distinct nuclear increase. The iris is much inflamed, though less atrophied. Its peripheral part is adherent to the cornea. It is greatly advanced in front of the rest of the iris, and is strongly curved forwards, as if by some pressure from behind. The ciliary folds where furthest removed from the tumour are not shrunken. Nearer the tumour they are some-	.. ..	.. ..

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of Uveal Tract*—continued.

No. 612.—*continued.* still T.n, but doubtful p.l. 5 days before excision, the patient came with pain of 3 weeks' duration. Scleral injection and T. 3.* * The microscopical specimens of this case were prepared by Dr. L. W. Fox.		whose large round or oval nucleus is surrounded by a protoplasmic zone of very irregular outline. There is no stroma between the cells, though rare bands of fibrous tissue, apparently the remains of the connective framework of the choroid, traverse the tumour. Some blood-vessels are met with, and they are apparently surrounded by a sheath-space. In front of the anterior abrupt termination of the choroid, there are scattered a few rounded masses of cells of similar character, as well as some smaller cells still more in front, arranged in lines between the central choroidal lamellæ. The choroid on either side of the O. D. is invaded, and nearly destroyed by similar cells	what atrophied. In neither case are they advanced, but there is always a wide interval between them and the peripheral part of the iris. The O. N. contains a great increase of connective tissue, especially round its blood-vessels. There are large nuclei in it, principally arranged in rows, which may occupy the place of the remains of the nerve-bundles. They have some similarity to, and might be taken for, tumour cells.	

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of the Uveal Tract*—continued.

No. 612.—*continued.*		arranged in similar rounded groups. Smaller editions of the same are seen in the inner retinal layers.				
No. 470. Henry D., æt. 37, sailor. Under care of Mr. Streatfeild. He found out accidentally 6 months ago that the outer half of his field of vision was deficient. He had no other inconvenience till a month ago, when he had pain in the eye, lasting more or less till its removal. *At excision*, conjunctiva inflamed and chemosed: pupil widely dilated. The retina is detached; the lens and choroid are *in situ*.	Tension increased. Arteries of ciliary body dilated and crowded with red blood corpuscles.	A tumour projects from the choroid of the inner side, involving the inner part of the ciliary body, where it is 10 mm. thick. Its posterior end, which shelves off gradually, is 5 mm. removed from the O. D. The tumour, where it is thickest, has a narrow internal zone like an unaltered chorio-capillaris. In its centre it consists of smallish, round, deeply staining unpigmented bodies, mixed with larger pigment masses, some of which are elongated, though most are rounded. In its external layers these last predominate, and some of them are found in the inner part of the adjacent sclera. The tumour has	The O. N. has its fibrous trabeculæ hypertrophied, and its nuclei are increased in number and in size. The same in the inner and outer sheaths of the O. N. and in the loose tissue between them. The side of the O. N. farthest removed from the tumour contains a still larger number of nuclear bodies, not in its fibrous tissue alone, but also within its nerve-bundles. The retina contains a slight excess of round nuclei in its inner layers. There are no pigmented cells either in the retina or in the O. N. The ciliary body is much shrunken and fibrous in structure. The ciliary folds, though much shrunken in	..	..	..	..

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of the Uveal Tract*—continued.

No. 470.—*continued.*		a scanty fibrillated stroma and many large thin-walled blood-vessels. At its posterior thin edge the smallish round unpigmented cells are seen to extend into the outer layers of the surrounding choroid and the adjacent scleral layers. The middle choroidal layers contain a slight increase of their pigment. There is also a general thickening of the choroid due apparently to a thickening of its fibrous lamellæ. The choroid nearer the O. D. presents no increase in its thickness, and no excess of nuclei. The sclerotic presents a general nuclear increase, especially in the loose tissue on its exterior, where the nuclei are very like the smaller cells of the tumour.	volume, are advanced so as in places to be close to the peripheral part of the iris, to which, however, they are not adherent. The iris is atrophied, and its peripheral part is applied to the cornea.		

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of the Uveal Tract*—continued.

No. 121. Lucina G., æt. 29, under care of Mr. Hulke. For 2 years her *Left* eye has been getting gradually dim. Six days ago it became painful. The pupil was semi-dilated and fixed. This case is mentioned in its relations to increased tension in vol. ix., p. 225.	Tension increased. Arteries of ciliary body enlarged.	The retina is detached, but not contracted. On the outer side is a choroidal sarcoma, extending from 5 mm. behind the ora serrata to within 2 mm. of the O. D. Its most internal part, the size of a small bean, is connected by a narrow neck with a broader base, which shelves gradually into the surrounding choroid. Microscopically the tumour is a sarcoma composed of small round cells.	The ciliary body, especially its muscular fibres, and the iris are inflamed. The first is a little atrophied. The ciliary folds, however, are not shrunken; they are adherent to the lens-capsule, and sometimes appear to be somewhat advanced so as to be near to, at times in contact with, and even adherent to the posterior surface of the iris, whose extreme peripheral part is adherent to the extreme corneal margin. The posterior pigment epithelial layer near the more internal part of the iris is adherent to the front of the lens-capsule. There are no microscopical specimens of the O. D.	.. ..	.. ..

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of the Uveal Tract*—continued.

No. 26A. Female, æt. 37. Specimen received from Dr. Bell Taylor. Three years ago the sight of the eye failed and a tumour was diagnosed.	Tension and arteries as above.	A sarcoma of the outer part of the choroid extends from the ciliary body to the O. D. It appears to be constituted by a thickening of the middle and outer choroidal layers by small oval unpigmented cells, and also by larger bodies containing pigment. The latter are found especially in the outer layers of the tumour. It contains also a moderate number of thin-walled blood-vessels. The chorio-capillaris does not appear to be much affected, but can be traced in sections as a thin zone on the inner surface of the tumour. There are places in the tumour where the unpigmented cells appear to be degenerated, and thus unstained granular areas are formed, surrounded by a zone in which pigment granules are abundantly scattered.	The ciliary body and iris are inflamed and somewhat atrophied. The iris periphery is adherent to the cornea. There is some increase of nuclei in the sclerotic and cornea, especially in the episcleral tissue and in the walls of its blood-vessels. There is great excess of nuclei in the O. N. and some increase in its connective tissue.	The sclerotic is very thin and staphylomatous at the outer equator, where it is nearly perforated by the tumour.	.. ..

No. 419. George B., æt. 49, under care of Mr. Tay. Left eye painful for 2 years. *At excision*, no *p.l.* There is a large prominent staphyloma of the upper ciliary region, with ciliary thinning elsewhere.	Tension increased. Arteries of ciliary region not recognisable.	The retina is detached and with the lens has almost disappeared from recognition. A tumour, the size of a hazel-nut, projects from the choroid at the outer side of the eye, overhanging the O. D. It has a narrow neck, and then shelves gradually by a broader base into the unaffected choroid, extending in front beyond the equator. It is made of cells whose body is formed by an oval staining nucleus, in which is a dot-like nucleolus. The extremities of the cell are drawn into short tails. The blood-vessels of the tumour are thin-walled and not very numerous. The relation of the tumour to the choroidal layers cannot be traced with any certainty.	The fibrous trabeculæ of the O. N. are hypertrophied. They contain a slight excess of nuclei. The nuclei of the nerve-bundles are also increased; some are very like tumour cells in size and shape; they contain, however, in place of a dot-like nucleolus, several fine granules. The ciliary body and iris are much shrunken. They contain a considerable excess of nuclei and but very little muscular structure. The pigment epithelium layer of the P. C. R. consists, apparently, of elongated brown pigment cells disposed loosely at slightly different levels, with a fibrillated nucleated tissue between them. It is, on the whole, considerably less darkly pigmented than usual. The fibres of the zonula are hypertrophied and contain an excess of	.. ..	18 months later there was no recurrence.

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of the Uveal Tract*—continued.

No. 419.—*continued.*			nuclei. The ciliary folds are excessively thin, much extended forwards, and are in close contact with the iris, which is adherent to the cornea. There is nuclear increase both in sclerotic and cornea, and more especially in the walls of the blood-vessels of the episcleral tissue.		
No. 367. Clara W., æt. 23. Left eye dim 8 months, pain 6 weeks. Some of the points in this case have been already briefly reported in its relations to glaucoma, in vol. ix, p. 401.	Tension increased (T. 1). Arteries of ciliary body much enlarged, as also the long ciliary arteries.	There is a sarcoma the size of a small bean at the lower and inner quadrant of the globe, reaching from just in front of the equator to the O.D. and just extending round this into the choroid on its opposite side. The tumour is smooth and very slightly pigmented. It is permeated by large and numerous thin-walled blood-vessels. It is made up of fusiform nucleated cells. The retina is detached and semi-contracted.	The ciliary muscle is somewhat atrophied and a little inflamed. The iris also is a little inflamed, its peripheral part is applied to the cornea. The ciliary folds are not much shrunken, but far removed from the iris. There is considerable increase of nuclei in the optic nerve trunk, probably due to a neuritis.	There appears to be a general slight increase of nuclei in the choroid.	.. ..

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of the Uveal Tract*—continued.

No. 240. Patient under care of Mr. Lawson (not from Moorfields Hospital). Globe much enlarged, with great ciliary thinning, especially at upper part. Cornea leucomatous at lower part, and to this the iris and lens are adherent. Retina detached.	Tension probably much increased.	An unpigmented tumour the size of a hazel nut overhangs the O. D., and appears to spring from it by a narrow pedicle. In reality, however, its connections are with the adjacent choroid. It consists of round or slightly oval cells with dot-like nuclei, and contains numerous thin-walled blood-vessels. The tumour cells are in immediate relation with these.	The O. N. has its trabeculæ hypertrophied. Bodies resembling tumour cells are scattered evenly in the nerve bundles, which contain no nuclei other than these. The sclerotic contains an excess of evenly-distributed large nuclei, which, however, are especially abundant in the walls of its blood-vessels.	..	..	..	..
No. 497. George W., æt. 43, sailor, under care of Mr. Tweedy. He noticed nothing wrong till 9 weeks ago, when he had severe pain in his *Right* eye during the night. Next morning he found he had no *p.l.* with it. The pain	Tension much diminished at excision. Arteries of ciliary body are very small.	The retina is detached and scarcely recognizable except near the O. D., where it presents an occasional brown pigment mass in its inner layers, but is otherwise quite unaffected. The choroid below is thickened into a dark coloured mass which extends from the lower ciliary region, which it involves right up to the lens, to the O. D. which it	The ciliary body is shrunken and converted into fibrous tissue, which contains scarcely a trace of muscular structure. The pigment epithelial layer of the P. C. R. is represented by several very imperfect layers of isolated brown masses, between and internal to which is a layer of imperfectly fibrillated nuclear tissue. The iris is	..	..	..	..

B.—*Intra-ocular Tumours.* (*a*) *Sarcoma of the Uveal Tract*—continued.

No. 497.—*continued.*					
lasted 2 days, and since then he has had only slight pain occasionally. *At excision,* cornea clear. A.C. shallow, lens advanced near the cornea, pupil large, iris discoloured and dark, especially at its lower part.	.. ..	overhangs. Its anterior part is 6 mm. thick, and the tumour cells even extend into the adjacent peripheral part of the iris. Microscopically, it is made up of rather small cells of round or slightly oval shape. They stain well and contain no nucleus, but many fine granules. They have no unstaining peripheral zone. There is no stroma other than the numerous very large, thin-walled, blood-vessels. In the tumour there are occasional tracts which scarcely stain at all and are made principally of large pale-brown pigment masses with an ill-defined intermediate substance. These are probably the seats of previous hæmorrhages. There are occasional more darkly pigmented tracts, especially	atrophied and its peripheral part adherent to the cornea. There is considerable excess of nuclei in the cornea and sclerotic, and more still in the episcleral tissue, especially in the walls of its blood-vessels. The nuclei of the sclerotic in the neighbourhood of the tumour can be traced in all gradations from ordinary connective tissue nuclei into bodies very like the unpigmented cells of the tumour. In the inner scleral layers at this part there are many pigmented cells. The optic nerve has its fibrous trabeculæ hypertrophied and very vascular. There is an increased number of nuclei both here and among the nerve-fibres. All gradations are presented from connective tissue nuclei to tumour cells.		

No. 497.—*continued.*		near the sclerotic. At the edge of the tumour its cells extend into all the layers of the choroid though less far into the chorio-capillaris than the rest.	All are pretty evenly scattered.		
No. 225. Charles T., æt. 28, sailor, under care of Mr. Hutchinson. Dimness of *Left* eye noticed 7 months ago. Three months after that sudden pain came in it during the night. He had then scarcely *p.l.* with it. Two weeks later the lower part of the cornea became ulcerated. *At excision* there was leucoma of cornea consequent	Minus tension at excision. The arteries of the ciliary body are very small.	There is a sarcoma the size of a pea growing from the choroid at the inner equator. Its posterior part does not extend to within 4 mm. of the O. D. Its anterior part overhangs the ciliary body but does not reach the lens. It rises rather abruptly at its margin from the choroid, which is somewhat thickened by an excess of very dark pigment cells in its outer layers and by similar cells mixed with smaller, unpigmented, roundish, deeply-staining cells in its middle layers. The chorio-capillaris is very	The O. D. is much swollen. There is a great increase in the number of staining nuclear bodies in the O. N. These present all shapes intermediate between the elongated connective tissue corpuscles of fibrous tissue and bodies very like the unpigmented cells of the tumour. The structure of the ciliary body and iris, especially the muscular fibres, is much atrophied, but neither shrunken up nor sclerosed. The apices of the ciliary folds are adherent firmly to the lens capsule. They are not	The retina is *in situ*. The vitreous is yellowish in tinge, but otherwise normal. There is nuclear increase in the sclerotic and cornea, especially in the walls of the blood-vessels and in the episcleral tissue generally. Some of these last are very	Three years later there was no recurrence.

B.—*Intra-ocular Tumours.* (*a.*) *Sarcoma of the Uveal Tract*—continued.

No. 225.—*continued.*				
on the ulceration.	.. ..	little affected, and can be traced over the greater part of the tumour as a thin layer. The tumour itself has the pigment cells in excess in its outer layers, and the small unpigmented cells more abundantly in its internal part. These last are generally oval and contain fine granules. There are among them numerous thin-walled blood-vessels. The uninvolved choroid is thickened by extreme tortuosity and enlargement of the blood-vessels of its middle and outer layers. There is also a great increase of darkly pigmented stellate cells in the same layer.	shrunken but still quite clearly separated by an interval from the periphery of the iris, which is adherent to the cornea. The posterior surface of the more central part of the iris is adherent to the lens capsule. There is an excess of stellate brown pigment cells among the remains of the muscular fibres of the ciliary body and in the iris. The pigment from the epithelium of the anterior part of the P. C. R. is collected in rounded lumps, which are scattered irregularly in the subhyaloid space.	like the tumour cells.

No. 307. Richard E., æt. 5, under care of Mr. Adams. *Left* eye noticed for 2 months as presenting a white reflex. Ant. chamber of moderate depth. Pupil dilated. The iris is flat and the lens *in situ*.	Tension increased. Arteries dilated.	Posterior part of tumour forms a solid mass of glioma cells projecting from O.D. In the anterior part of globe the detached retina is recognizable; its folds as seen in section are occasionally thickened into the tumour. The thickenings often appear as if due to a proliferation of the inner granules. Sometimes, however, the thickening is found most distinctly in the outer granules alone. It often extends from the inner granules into the nerve cell and fibre layers. Each blood-vessel of the tumour has a space round it, as if it had a lymph-sheath space free from tumour cells. Near the O.D. zones of cells deeply staining with logwood surround the blood-vessels, whereas, those further removed from them stain less.	The nerve fibres in the centre of the papilla are replaced by glioma cells, which extend backwards as far as the lamina cribrosa. The O.N. is free from the tumour, but there is a little neuritis. The choroid is free. The ciliary body is much inflamed, but not atrophied. The iris is a little inflamed; its peripheral part is a little atrophied where it is adherent to the cornea. The ciliary folds are of fair size, and somewhat advanced, so as to be in some specimens very near to the posterior surface of the peripheral part of the iris. The lig. pectinatum and neighbourhood of the canal of Schlemm are rather inflamed. The first is shrunken and partly sclerosed.	The cornea and sclerotic have yielded to pressure from within the eye, both in front and behind the sclero-corneal junction, which retains its position. Their nuclei are decidedly increased, especially in the episcleral tissue and in the walls of its blood-vessels.	The tumour recurred, and the contents of the orbit together with the enormously thickened lids were removed. Chloride of zinc paste was afterwards used. Two months later the tumour had recurred a second time and grown to a very large size. The child died shortly afterwards.

B.—*Intra-ocular Tumours.* (*b*) *Glioma of the Retina*—continued.

No. 257. Bertie H., æt. 2½, under care of Mr. Hulke. A white reflex was noticed from his *Left* eye 9 months ago. *At excision,* his cornea was rather prominent; his pupil widely dilated, with a reddish-yellow mass visible through it.	Tension increased. Arteries dilated.	A large solid mass of tumour cells project from the O.D. The anterior part of the retina is not involved in the tumour. The choroid on either side of the O.D. is vastly thickened; its structure is destroyed and replaced by glioma cells. Each vessel of the tumour, whether an artery, capillary, or vein, has surrounding it a loose zone of connective tissue, apparently its sheath. This is quite free from tumour cells.	The optic nerve is very short, but, as far as it goes, its nerve bundles are entirely replaced by glioma cells. In it are longitudinal streaks of a lighter coloured tissue, which appears to be fibrillated imperfectly. The ciliary body is very little atrophied, but considerably inflamed. The iris periphery is much atrophied where it adheres to the cornea: elsewhere, the iris is much inflamed, but not atrophied. The ciliary folds are advanced, so as to be in some specimens close to the iris.	The sclerotic cornea and scleral-corneal junction are as in the case above, 307. The globe is nearly full. The ant. part of the retina is detached.	The tumour recurred in the orbit.
No. 258. James W., æt. 6½, under care of Mr. Couper. Nothing was wrong as far as known till 7 months ago, when he received a blow on his *Left* eye,	Tension has undoubtedly been increased. No information as to ciliary arteries.	The tumour fills the globe. Its anterior part is semi-fluid. Its posterior part projects as a solid mass from O.D., and in it no retinal structures can be recognized. Tracts of fibrous tissue extend into it	The deeply staining glioma cells only extend into the superficial layers of the lamina cribrosa. The cells found more deeply stain but faintly with logwood. They are found between the hypertrophied fibrous	The ciliary body was not examined microscopically. The iris was in contact with the cornea.	The child died with cerebral symptoms 1 month later. The eye was so tender that it was difficult to esti-

B.—*Intra ocular Tumours.* (*b*) *Glioma of the Retina*—continued.

No. 258—*continued.* which however appeared to cause no structural lesion. Two weeks later his father noticed that the child could not see with that eye. *At excision* the upper ciliary region was very staphylomatous.		from the O.D. as well as blood-vessels. Each blood-vessel has a distinct and large sheath space free from tumour cells. The glioma contains many hæmorrhages and calcareous particles, which are visible to the naked eye.	trabeculæ of the nerve, taking the place of the nerve-bundles. The central artery is flattened; its endothelium is a little proliferated. The vein is not recognizable. The connective tissue ensheathing them is free from tumour. The inner and outer sheaths of the O. N. are fused together. They are much thickened; their fibres are separated somewhat, and between them are sometimes found glioma cells, which stain very faintly. The diameter of the nerve and its sheath is much increased.		mate the tension. The patient, as well as the other 3 children of the family, looked strong and well-nourished.
No. 162. Charlotte W., æt. 4, under care of Mr. Streatfeild. The parents have noticed a white reflex from	Tension increased. Ciliary arteries dilated. They are filled with a structure-	The tumour projects from the O.D. as a solid mass of glioma cells, which contain tracts of fibrous tissue and blood-vessels provided with sheaths. As we pass for-	The glioma cells are sparse among the fibres of the lamina cribrosa, but behind it they entirely replace the nerve fibres, forming solid columns, se-	The tumour recurred in the orbit, apparently in the optic nerve stump.	The uniformly-distributed nuclear bodies of the deeper parts of the nerve

B.—*Intra-ocular Tumours.* (*b*) *Glioma of the Retina*—continued.

No. 162—*continued.*					
the eye for 6 months.	less substance in which some bodies like white blood - corpuscles are observed.	wards the retina gradually emerges from the tumour, and its more anterior part, though detached, is unaffected, except that isolated tracts of glioma cells are found in its nerve fibre layer, thickening the retina. The centre of each tract is seen to be a small artery, which is surrounded by its sheath space, and then by the cells. The choroid is invaded by glioma cells only at the upper and inner part of the globe. In front some cells are seen on its internal surface.	parated from each other by the fibrous trabeculæ of the nerves. Farther away from the eye these columns end abruptly, though not quite at the same level. Beyond them, nuclear bodies somewhat like glioma cells, or like enlarged connective tissue nuclei are abundantly and uniformly distributed among the nerve fibres for some distance. The cut end of the nerve is in this condition. The arteria centralis and its sheath are perfectly free throughout. The ciliary body is inflamed and much atrophied. The ciliary folds are much atrophied, but extend to a considerable distance directly inwards. The iris is inflamed and its periphery adherent to	The cells of the mass were traversed in places by fibrous bands. Elsewhere they were spreading between fat-cells.	might have passed for evidences of neuritis, except that they were too large, and that the tumour recurred after the nerve had been divided here. They might well pass for glioma cells spreading from the tumour, except for their uniform distribution, both near and farther away. Might they be neuroglial corpuscles taking on the cha-

No. 162—*continued.*			the cornea. The pars ciliaris retinæ has no tumour cells on its internal surface.		racters of glioma cells?
No. 256. George G., æt. 5. He has had a cast in his *Left* eye since birth, and 6 months ago his parents noticed a white reflex from it. *At excision* he has had pain and inflammation in it for 3 weeks.	Tension increased. Arteries of ciliary body enlarged.	The entire lower part of vitreous cavity is filled with tumour cells. The upper and outer part is more free but still dusty, with scattered cells. Upper and outer part of retina free. In a horizontal section through the O. D. one limb of the retina is entirely converted into deeply staining glioma cells, whereas the other limb, though detached, is entirely free with the exception of a little thickening of both layers of granules close to O. D. The tumour presents the usual characters. All its blood-vessels have distinct sheaths. The choroid is free from tumour cells.	The tumour cells extend a little way into the optic disc, but do not reach the lamina cribrosa. Beyond this the fibrous trabeculæ of the nerve contain more and larger nuclear staining bodies than normally. This may be due to some slight neuritis. The O. N. was cut rather close to the globe in the excision. The ciliary body and iris are much inflamed, but not atrophied. The most anterior ciliary folds are directed forward so as to be almost in contact with the periphery of the iris, which in its turn is adherent to the cornea. Numerous tumour cells are on the pars ciliaris retinæ,	There is much inflammation of the loose episcleral tissue and its blood-vessels.	The patient was seen 1½ years later, and there was then no recurrence. The slight excess of nuclei in the nerve was probably due to neuritis only.

B.—*Intra-ocular Tumours.* (*b*) *Glioma of the Retina*—continued.

No. 256.—*continued.*			especially between the ciliary folds, and some lie in the ligamentum pectinatum. Many of the ciliary folds are directed directly inwards.		
No. 420. Arthur F., æt. 2½ (*Right* eye excised during the temporary absence of the Curator). Ant. chamber normal. Globe apparently full of glioma mass. Under care of Mr. Wordsworth.	No note of tension. Arteries of ciliary body are somewhat enlarged.	The globe is full of a soft glioma mass which projects from its attachment at the O. D. The retina is not recognizable in the posterior part of the globe though its front part and the pars ciliaris are quite unaffected. The choroid is free from tumour cells. On either side of the O. D. the sclerotic has yielded somewhat to pressure from within the globe.	The tumour cells extend into the O. N. as far as its cut end which is not far removed from the eye. They form linear tracts separated by the hypertrophied fibrous trabeculæ, especially near the circumference of the nerve. The ciliary muscle and iris are inflamed but not atrophied. The iris periphery is adherent to the cornea. The ciliary processes are adherent to the cornea. The ciliary processes are advanced and in some instances are applied to the adjacent posterior surface of the iris.	The lens is *in situ*. The cornea and sclerotic have yielded to the intra-ocular pressure both in front of and behind the sclero-corneal junction. The corneal and scleral tissue is inflamed.	When seen 4 months later a firm rounded mass could be felt under the upper lobe of the conjunctiva. It rapidly increased in size. The lump was first noticed by the parents a month before.

B.—*Intra-ocular Tumours.* (*b*) *Glioma of the Retina*—continued.

No. 130. Florence G., æt. 2 months, under care of Mr. Streatfeild. The parents noticed something wrong with the child's *Right* eye 3 weeks ago. There is now a reddish-yellow reflex from behind lens. The pupil is of medium size. The ant. ch. is shallow.	Tension increased. Circulus arteriosus much enlarged.	A mass of glioma cells projects from the O. D., from which arteries are seen passing into it. No retinal structures can be recognized here, but the anterior part of the retina is but little changed in structure, though it is detached and folded forward on the pars ciliaris retinæ. At a little distance behind the ora serrata the tumour begins as if a thickening of the outer granules (Glioma Exophytum. Hirschberg). The inner granules become also affected, and a little further back the nerve cell and fibre layers are much thickened by tumour cells. A little further back all traces of retinal structure are lost. The globe is filled by the soft yellowish glioma mass which contains numerous calcareous particles.	The tumour cells extend into the nerve as far as the lamina cribrosa, and a few are found among the most superficial fibres of this. It is much pushed backwards. Behind it no tumour cells are recognized for certainty in the optic nerve, though large nuclear bodies are distributed through it more abundantly than in the normal state. These may, however, be the result of a neuritis. The ciliary body and iris are much inflamed but not atrophied. The iris periphery is applied to the cornea. The ciliary processes are considerably advanced. Nodules of glioma cells are seen on the pigment epithelial cells on the vitreous lamina of the choroid near the O. D., but otherwise the choroid is free.	The cornea and ciliary sclerotic have yielded more than that at the sclero-corneal junction, which thus appears as if pulled in. The cornea and sclerotic are somewhat inflamed.	13 months later there was a yellowish vascular reflex from the *Left* eye which was blind. The child seemed still healthy and well nourished. 2½ years later the *Left* was excised (*see* No. 542 below). There was no return in the *Right* socket. The other children of the family appeared strong and healthy.

B.—*Intra-ocular Tnmours.* (*b*) *Glioma of the Retina*—continued.

No. 542. The left eye of Florence G. (*see* above). This was excised $2\frac{1}{2}$ years later than the other.	Cornea perforated and tension now diminished. Ciliary arterial circle not recognized in the much atrophied ciliary body.	The tumour cells fill the globe. No trace of retinal structures is found anywhere. The choroid cannot be recognized at all at the posterior part of the globe. Tracts of deeply staining tumour cells surround the blood-vessels, but the intervening cells stain very little and are of very faint outline. The cells near the sclerotic are the most deeply staining of all. The pars ciliaris retinæ is unaffected.	The cells extend from the globe into the optic nerve for a little distance, but soon they become replaced by a nearly structureless, very slightly fibrillated, substance which fills up the gaps between the hypertrophied fibrous trabeculæ of the nerve. The nerve sheaths have their fibrous tissues enormously hypertrophied. The intersheath space can only be recognized by the cells like those of glioma, which are found tolerably abundantly here. The ciliary sclerotic and cornea are much stretched and thinned. The ciliary body is vastly thinned. Its structure is more fibrous than muscular. Remains of an inflammatory exudation are found on its internal surface. The iris is much thickened by occasional nodules of glioma cells in its structure, and	There is an uniform staphylomatous bulging of ciliary cornea and sclerotic. The cornea and episcleral tissue contain abundant deeply staining nuclear bodies. Similar bodies are found in the sclerotic and in the walls of its blood-vessels.	It is interesting to note the condition of the optic nerve with regard to the question of transmission of the tumour from one eye to the other. Note also that there was no recurrence in the socket of the Right eye.

B.—*Intra-ocular Tumours.* (*b*) *Glioma of the Retina*—continued.

No. 542—*continued.*			also by a tough fibrous exudation on and in its posterior wall, in which the remains of the lens capsule are embedded. It is adherent to the cornea.	
No. 343. Eleanor P., æt. 3, under care of Mr. Adams. The parents have noticed something wrong with the *Left* eye for 7 months. The child is a little pallid, but well nourished.	Tension 2. Ciliary arteries dilated.	A solid mass, composed of cells with penetrating bands of fibrous tissue and blood-vessels with sheaths, projects from O. D. As we pass forwards it soon resolves itself into the much thickened retina. The thickening is distinctly due to an infiltration of tumour cells into the nerve cell and fibre layers, for the granule layers are undoubtedly unchanged in many places. The choroid is free from tumour cells.	The tumour cells do not extend back in the optic nerve beyond the lamina cribrosa. The nerve presents an increase of the nuclei of its trabecular tissue, but is otherwise healthy. The ciliary body and iris are a little inflamed, but not atrophied. The iris periphery is applied to the cornea. The ciliary folds are covered with glioma cells. They are rather attenuated and somewhat advanced, so as to be close to the posterior surface of the adjacent *iris*.	The remains of the vitreous lie behind the lens, and occupy only a fifth part of the normal space.

B.—*Intra-ocular Tumours.* (*b*) *Glioma of the Retina*—continued.

No. 539. Thomas C., æt. 3¾, under care of Mr. Lawson. His parents noticed a white reflex from his *Right* eye 22 months ago. It became gradually more conspicuous till 6 months ago, when the pupil was dilated. Since then he has had pain. Now cornea clear except for some glioma cells on its posterior surface. The ant. chamber is extremely deep and wide. Lens semi-opaque. Much ciliary thinning, especially above.	Tension 2. The ant. part of the ciliary body is invaded by tumour cells, and its artery cannot be recognized.	The tumour extends forwards from O. D. as a band composed of blood-vessels, a little fibrous tissue, and glioma cells. Its narrowness appears to be due to the compression exercised by the much thickened choroid on either side. Anterior to this the glioma cells fill the entire vitreous cavity up to the posterior surface of the lens. Among them are many calcareous particles. The most anterior part of the retina is unaffected. It is folded forwards on the ciliary body, though separated from this in front by tumour cells. The choroid is vastly thickened by tumour cells, which have destroyed its proper structure.	The glioma cells extend back into the nerve very abundantly as far as the lamina cribrosa. In this they are more sparsely mixed with its fibrous tissue. Behind it they are again more abundant, and they only terminate just in front of the cut end of the nerve. Close up to this there are scattered a moderate number of staining bodies, which may be tumour cells. The ciliary body is somewhat inflamed and atrophied. Glioma cells are found in the connective tissue just below its internal surface, and abundantly over the region of the pars ciliaris retinæ, which cannot itself be recognized. The ciliary folds are attenuated and much stretched forwards. They are, however, far removed from the peripheral part of the iris and cornea by	The globe is enlarged in all its diameters. The anterior chamber of the aqueous is enormously deep and wide.	The patient looks very healthy and well-nourished. The tumour recurred shortly in the socket with a fatal result. The *Left* eye also became gliomatous. He died in convulsions.

B.—*Intra-ocular Tumours.* (*b*) *Glioma of the Retina*—continued.

No. 539—*continued.*			reason of the staphyloma of the latter. There is a staphylomatous thinning and bulging of the margin of the cornea, with which the remains of the atrophied iris periphery have coalesced. Tumour cells are found on the pigment of the posterior surface of the iris and in its tissue close to its anterior surface. Hence they extend into the adjacent corneal lamellæ. Glioma cells are also found on Descemet's membrane.		

CURATOR'S PATHOLOGICAL REPORT—continued.

Two Cases of Glaucoma of extremely short duration.

THE microscopical preparations were made by Dr. L. Webster Fox.

601. Charles F——, æt. 37. Under care of Mr. Tay. Six days before excision a fragment of metal penetrated the cornea and wounded the lens of his left eye. Three days later, when he came as out-patient, the tension was increased and the anterior chamber scarcely existed. After three more days there was severe pain with T 3: the eye was then excised, but no foreign body was found.

The eye generally was healthy though the lens was opaque, rather soft, thinned from before backwards and bulged forwards so as to fit closely to the posterior surface of the iris which was applied to the cornea. There was considerable excess of nuclei in iris and ciliary body, especially about their muscular tissue. The fibres of ciliary muscle were lengthened in a meridional direction and decidedly attenuated. The ciliary folds were small and displaced backward: arteries of ciliary body somewhat enlarged. Canal of Schlemm and episcleral tissue moderately inflamed.

The optic nerve has a decided increase of nuclei in its connective tissue. The disc is not cupped. There is no excess of nuclei on its vitreous surface. The choroid is not inflamed, but is rather thin and atrophic.

616. Robert S——, æt. 44, under care of Mr. Tweedy. Seven weeks before excision he came complaining that the sight of his left eye had been failing for a year. The retina was found detached at the lower and outer part, but he still read Jaeger 20. Pupil large and sluggish: tension diminished. Ten days before excision, after a violent attack of pain during the night, he found he could not see light. Three days later his eye was tender with T.n., but still no *p. l.* The next day there was great pain with increased tension for which an iridectomy was performed three days later. Still the tension recurred with great pain necessitating excision.

At excision: The retina was detached in an umbrella form.

A pedunculated tumour the size of a large pea sprung from the lower and outer part of the choroid, which it involved by a flattened base nearly as far as the ora serrata in front and to within 4 mm. of the papilla behind. Its cells are spindle-shaped, its vessels are numerous, large, and thin-walled. The uninvolved chorio-capillaris can be traced over nearly the whole internal surface of the tumour. Similar cells are found in the outer layers of the adjacent choroid. They do not, however, reach so far as the optic disc, the intervening choroid being compressed and atrophied, though its vessels are full of blood corpuscles.

The episcleral tissue corresponding to the tumour is much thickened and inflamed, and this condition extends all the way, though in a less degree, backwards to the optic nerve and forwards to the ciliary region.

The iris and ciliary body at parts removed from the operation are considerably inflamed, but not atrophied. The iris periphery is applied to the cornea; the anterior ends of the enlarged ciliary folds are in contact with it in places. The arteries of the ciliary body are enlarged. The lig. pectinatum is inflamed. Inflammation can be traced along vessels extending between the inflamed episcleral tissue and the ciliary body

CURATOR'S PATHOLOGICAL REPORT—continued.

Seven Cases of Suppurative Hyalitis.

THE following cases have been selected as being fairly illustrative of the phenomena of pus-formation in its various stages:—

No. 513. Flora D——, æt. 7, under the care of Mr. Lawson. Two weeks ago she received a blow which caused a penetrating wound of sclerotic just below the corneal margin. At excision T 1. *Cornea* clear. Iritis many pointed posterior synechiæ: no hypopyon. *Vitreous:* posterior part is thin and fluid and purulent. Anterior part more consistent and purulent. *Sclerotic* inflamed. This change extends backwards from its ciliary part to the optic nerve, and is continuous with the neuritis there.

Ciliary body. Arteries enlarged. Ciliary muscle is of fair size and shape, its bundles thickened with far more nuclei than usual on them and also scattered between them; most of them are elongated. A few multi-nuclear corpuscles are scattered equally over the connective tissue of the ciliary body, but not more towards its pigment epithelium surface, but rather less.

P.C.R. Columnar elements vastly elongated except at extreme front part: their nuclei are always large, oval, and pale. The pigment on which their external ends rest is a little increased, but not much. Among these columnar elements, but distinct therefrom, are vast numbers of smaller deeply staining multi-nucleated bodies, continuous internally though not equally thickly into the vitreous: externally they go right up to the pigment cells but not beyond them, the connective tissue of the ciliary body being perfectly free therefrom.

Internal to the P.C.R. is a stratum somewhat fibrillated concentrically in which cells are found, some exactly like vitreous corpuscles, others similar but caudate.

Next follows a broad zone consisting of a fine reticulum produced probably by the coagulation of some albuminous substance; within its meshes deeply staining multi-nuclear cells (2, 3, or 4 nuclei) lie scattered. Still more internally, and occupying the vitreous centre, is a mass consisting of large cells,

most of which have a large feebly staining nucleus. The cell outline is ill-defined and their substance opaque and finely granular (diam. = ·024 mm.). Scattered among these latter are a few others (about 2 per cent.) resembling closely the smaller cells above described within the reticulum.

Optic disc much swollen: in and round walls of arteries of papilla are numerous uninuclear bodies. On the retinal surface of O.D. is a mass of cells, most of which are like vitreous corpuscles: some tend to fibrillation. There are also some smaller multi-nucleated bodies as in centre of vitreous. There are no multi-nucleated bodies in the walls of the inflamed blood-vessels of the papilla or in the optic nerve.

Choroid: round undivided nuclei are found in scattered groups in a few places.

Retina: nerve fibre layer much thickened with nuclear bodies of which a few are multi-nucleated.

Blood-vessels of the eye generally contain an excess of colourless blood corpuscles which are multi-nucleated.

NOTE.—All measurements and observations were made on preparations which had been hardened in Müller's fluid and alcohol.

No. 204. William B——, æt. 60. A cataractous lens was extracted 4 months ago. Though there appears to have been some slight iritis the eye did well generally till 2 months later, when increased tension came on. Iridectomy upwards was done and repeated downwards 6 weeks later, but without good result. After the second operation the vitreous suppurated.

Tension somewhat in excess. The arteries of the ciliary body are enlarged.

The iris is adherent to the scar of the wound at the edges of the iridectomy gap. There is a large excess of nuclei in the episcleral tissue, and a moderate excess in the corneal scars. The adjacent iris contains dense groups of nuclei at various points. The ciliary muscle is much inflamed as well as the connective tissue among its fibres and on its internal surface. The corpuscles found among the most external muscular layers are often multi-nucleated, while those in the internal layers have almost universally one nucleus alone. The pigment layer on the internal surface of the ciliary body has many multi-

nucleated cells visible among its pigment granules. The columnar elements of the P.C.R. are elongated and contain between them a very large number of multi-nucleated corpuscles. The vitreous zone internal to the P.C.R. contains comparatively few cell-elements distributed in a loose structureless reticulum. They are nearly always like vitreous cells, *i.e.*, large nucleated cells, though among them are scattered a few multi-nucleated bodies, like those among the columnar elements of the P.C.R. The vitreous in its more central portions consist of cells with no intervening tissue. They are large and mostly of very faint outline with a scarcely recognizable nucleus, though some are more distinct in outline, and have a large and distinct nucleus. Also there are a few smaller and multi-nuclear.

The O.D. is swollen much; there is great inflammation of the nerve trunk; in its anterior part the increase of nuclei predominates while in its posterior part there is considerable increase in its connective tissue. None of the elements found here show direct indications of multiplication by division of nuclei. The walls of the arteries of the papilla are thickened as if by inflammation, and there is a larger number of endothelial elements in them than normal. The choroid is thicker than usual, apparently from œdema; its nuclei are more abundant than normal at a few points only. Its blood-vessels are distended with red blood-corpuscles. The retina contains some excess of nuclei, especially in its nervous layers in the neighbourhood of the O.D. Its posterior part contains many rounded masses of nuclei, each corresponding apparently to the blocked lumen of a blood-vessel. Its anterior part is unaffected. Many cells, just like vitreous cells in excessive number, and some rather smaller and multi-nucleated, remain attached to the vitreous surface of the O.D.

The blood-vessels of eye generally contain white blood-corpuscles in excess, and these are multi-nucleated.

The sclerotic presents a general slight nuclear increase, especially in the blood-vessels of its most external layers, and the loose tissue over them.

No. 215. Robert R——, æt. 30, under care of Mr. Couper, had

gonorrhœal ophthalmia of *left* eye 8 years ago, which left the cornea leucomatous. Inflammation came on spontaneously 5 days before excision and was diagnosed as suppurative panophthalmitis. T. $1\frac{1}{2}$.

The *vitreous* greenish-white and opaque at centre in front; greenish and translucent behind: internal to ciliary processes there is a translucent layer, while on the ciliary processes themselves there is a purulent deposit.

Microscopically, the *iris* contains a considerable number of multi-nuclear with a still greater proportion of uninuclear corpuscles. The exudation in front of iris is made up of many multi-nuclear bodies in a scanty reticulum like coagulated albumen.

The *ciliary body* is infiltrated with nuclei; many are elongated, and like those of its muscular fibres; many are in its connective tissue, and especially in that near its internal surface: the vast majority of them are uninuclear, while very few are multi-nuclear.

P.C.R.: its pigment layer is a little irregular; it is separated from its basement membrane by an irregular layer of nuclei: Its *columnar elements* are scarcely recognizable, being obscured by many multi-nuclear bodies with a few pale pigment globes and scattered pigment granules. Then follows internally a zone, separated by a well-defined band (the hyaloid) from the columnar elements, and which consists of a reticulum and corpuscles, some large and uninuclear and quite like vitreous cells, others smaller on the average, and multi-nuclear. The central part of vitreous is made up entirely of cell elements, most of which are large, with a faint outline and uninuclear, others somewhat similar in appearance, but rather small, and multi-nuclear.

The *optic disc* is swollen: there are nuclei round its arteries, in their walls, and in the connective tissue of the optic nerve.

Choroid shows a general increase of uninuclear bodies which are not in especial relation with the blood-vessels: it is otherwise normal. There is no increase of colourless blood-corpuscles within the blood-vessels, but a considerable proportion of these visible are multi-nuclear.

The *retina* is slightly œdematous and contains a slight excess of multi-nuclear corpuscles, especially in its nervous layers,

and notably in the walls of its arteries. On its internal surface is a thin imperfect layer, some of whose cells are exactly like vitreous corpuscles and uninuclear, while others are similar but multi-nuclear; others, again, are the same, but smaller still.

The blood-vessels of eye contain some excess of white blood-corpuscles, which are multi-nuclear.

No. 510. Walter P——, æt. 44, under care of Mr. Tay. An accident to his eye 30 years ago appears to have been followed by iritis, for it has been dim ever since, though not otherwise troublesome. Acute spontaneous inflammation arose 14 days before the excision. T.n., or slightly increased.

The *vitreous* is opaque and purulent in its anterior central part; its posterior part is clearer. A much less opaque zone separates it from the ciliary processes, which are covered with a pus-like layer. The *optic disc* is swollen, its veins are very full and tortuous.

Ciliary body: the nuclei of its muscular fibres are increased in number. An increased number of uninuclear bodies is found in the connective tissue between them. The blood-vessels contain excess of proliferated endothelial (uninucleated) cells. Within them is slight excess of white blood-corpuscles, which contain 3 or 4 nuclei grouped together.

P.C.R.: its pigment epithelium layer is more highly pigmented and distributed over a larger area than normal: a layer of nucleated bodies (most of which have multiple nuclei) separates it from its basement membrane. Numerous similar bodies can be faintly seen among its pigment granules. Its *columnar* elements are elongated; numerous nuclear bodies (multi-nucleated) are found between them and on their internal surface in the sub-hyaloid space. The *hyaloid* is distinctly seen: internal to it is a broad zone, made of a fine reticulum as if of some coagulated albuminoid substance, containing but few cells (not 1 per cent. of those in the adjacent sub-hyaloid space and among columnar elements of P.C.R.): occasional ones are large and caudate, and some like ordinary vitreous corpuscles, whereas others are smaller and multi-nuclear. All are somewhat larger than typical white blood-corpuscles. Towards the vitreous centre is a solid mass of cells; all are large, with very indistinct

outline, and usually a single and faint nucleus, but some are multi-nucleated. No cells are so small as some of those described in vitreous near P.C.R.

Optic disc: Great excess of nuclei in walls of blood-vessels of papilla and in the loose tissue round them: great excess of nuclei in connective tissue of optic nerve. All, whether in the connective tissue or in walls of blood-vessels, are uninuclear. On the vitreous surface of optic disc is a cluster of nucleated bodies, some of which are large and distinctly vitreous cells; many are somewhat smaller and multi-nucleated. These are exactly similar to those near the vitreous centre, but a trifle smaller.

Choroid is free from nuclear increase generally, but there are some clusters of nuclear bodies in its middle layer near the optic disc.

Retina presents slight increase of nuclei in its nervous layer near optic disc, especially in walls of its arteries.

White blood-corpuscles are in excess in the blood-vessels and are multi-nuclear.

No. 191. Thomas S——, æt. 31, under the care of Mr. Tay. A fragment of metal traversed the cornea of his *right* eye 5 weeks before excision, and was subsequently found lying in front of the lower part of the vitreous cavity. *At excision:* T + : Iritis with extensive posterior synechiæ. Anterior chamber very shallow: lens cataractous: the detached retina extends from optic disc to ora serrata and is semi-contracted: an opaque yellow purulent substance lies in the front part of the cavity and represents the shrunken and suppurated vitreous.

The ciliary folds and lens are advanced and in close opposition with the iris. The iris-periphery is applied to the cornea. The ciliary arteries are enlarged.

Microscopical appearances: P.C.R. The columnar elements are much elongated in places, and their characteristic pale large oval nuclei are numerous and disposed at different levels (the Müllerian fibres of adjacent retina are also extremely elongated). Between them is a moderate number of small multi-nuclear bodies. The *pigment* granules of its pigment epithelium are black and scattered, especially towards its posterior part: among

them are evidences of numerous partly obscured multi-nuclear cells: occasional tongue-like processes of scattered pigment granules mixed with numerous similar multi-nuclear cells extend inwards from pigment epithelium of P.C.R. towards the cavity of the globe, raising up or extending between the columnar elements of the P.C.R.

Ciliary muscle: fibres inflamed; a number of nuclei are scattered between them (and also in iris), but extremely few bodies with multiple nuclei.

The shrunken *vitreous* is traversed by a fibrillation radiating towards the centre of its anterior part. Spindle-shaped and elongated nuclei are disposed at short intervals along the course of this fibrillation. Among them are a few blood-vessels running out from the ciliary body. Intertwined with this stroma are corpuscles much smaller on the average than the vitreous cells, many of them being multi-nucleated. Some few, however, are bigger and caudate with large single nuclei. In the neighbourhood of the ciliary body the vitreous is fibrillated in a direction parallel to its surface.

Optic nerve: here there is a great increase of round and oval nuclear bodies, none, however, are multi-nuclear.

Choroid contains a slight general increase of nuclei, but no multi-nucleated bodies.

Sclerotic shows a fairly marked nuclear increase.

Blood-vessels of eye generally contain slight increase of their white blood-corpuscles which are multi-nuclear.

No. 246. John W——, æt. 50, under care of Mr. Wordsworth. *Left eye.* Wound of lower part of cornea 32 days ago. Iris adherent to scar of wound; extensive posterior synechiæ.

Tension diminished. Arteries of ciliary body not enlarged.

Retina detached, except from its anterior and posterior attachments and semi-contracted. Remains of vitreous greenish-yellow and translucent above, whitish-yellow and opaque below near wound. Microscopically it consists of cells, most of which (diam. about ·020 mm.) are exactly like vitreous corpuscles; some others are a little smaller, with 2, 3, or 4 nuclei. Towards the periphery of the vitreous the larger are less abundant, and the smaller lie in the meshes of a reticulum produced by the

coagulation of some albuminous material. Many cells similar to these last lie among the vastly elongated columnar elements of the pars ciliaris retinæ. Its pigment epithelium layer is much disturbed; its pigment granules being scattered and raised from their basement membrane by the interposition of many unpigmented nuclear bodies of moderate size.

Ciliary body; muscular fibres not inflamed, though there is some excess of nuclei in the connective tissue between them and in that of its internal part, even close up to the basement membrane limiting it. They are most numerous in the posterior part of the ciliary body. Some fine blood-vessels of new formation enter the vitreous cavity from the ciliary body. They are crammed with multi-nucleated colourless corpuscles exactly like the smaller ones of the adjacent vitreous. In the blood-vessels of the more distant parts of the eye, *e.g.*, the choroid and optic nerve, the colourless corpuscles, though multi-nucleated, are little in excess.

The patient was anæmic in appearance. He died a year later, apparently of some chest affection.

No. 469. Adelaide H——, æt. 17 months, under care of Mr. Tweedy. Injury 5 days from a penetrating wound of the inferior part of cornea.

Now: T. 1.; cornea dull: aqueous purulent: prolapse of iris, iritis: vitreous is a small yellowish globe behind lens. Retina *in situ*. O.D. much swollen. Exudation on ciliary processes.

Microscopical appearances: P.C.R. The columnar elements internal to pigment layer are vastly elongated: apparently several nuclei in each at different levels but all these possess the same quite distinctive character, *i.e.*, are large, oval, and pale.

The *pigment* of its epithelial layer is brown and scattered, but not apparently from increase of pigment cells as such, but from dissemination of their brown pigment granules intermixed with which are numerous very deeply staining large oval nuclei, but which cannot be well defined.

There is a great increase of elongated nuclei in the fibres of the ciliary muscle, and many in the connective tissue between them and on their inner surface, but no multi-nuclear bodies anywhere. There are remains of large vitreous cells at back of lens capsule (diameter ·022 mm.): outline indistinct; some with

faint nuclei others more distinct; intermixed with these are other smaller multi-nucleated cells, *i.e.*, with 3 or 4 nuclei clustered together.

O.D. swollen: on it a mass of vitreous corpuscles (diameter ·02 mm. after hardening); their nuclei usually lateral and faintly staining; some with no nucleus. Some smaller ones with nuclei dividing as in front part of vitreous.

Walls of blood-vessels in papilla extremely thick: nuclei increased in their outer part and in the loose tissue around them. The white blood-corpuscles within arteries of optic nerve are multi-nuclear. Excess of nuclei in connective tissue of nerve, but none show any evidences of proliferation.

The *corneal* corpuscles are large and irregular both in shape and distribution.

ON THE PHENOMENA OF SUPPURATIVE HYALITIS AND THEIR RELATION TO THE "MIGRATION THEORY."

By R. G. Hebb, M.D., and W. A. Brailey, M.D.

These observations are made upon cases in which suppuration has occurred either spontaneously in a defective eye or in direct consequence of some local injury. The first stage of suppuration is that the vitreous becomes turbid with fine opacities, and rather more consistent. Retaining strongly its front attachments it separates readily from the retina behind, though less easily from the papilla than elsewhere.

As the suppurative process goes on, its anterior and central part becomes greenish-white and opaque, and the ciliary body is of a similar colour. A comparatively clear zone continuous behind with the similar posterior part of the vitreous, separates the two. The swollen papilla is also covered with opaque substance, from which white streaks radiate into the adjacent vitreous. The vitreous where it is in contact with the retinal arteries is also streaked with faint white lines corresponding to them. These lines broaden until the retina becomes covered with a thin opaque layer. The central and marginal opacities encroach upon the intervening clear substance until the entire vitreous has become opaque. The retina is swollen, opaque, and contains many purplish extravasations of blood. Its inner surface is wrinked. The vitreous becomes semi-fluid and pus-like (its central part first), and finally may disappear altogether, the hyaloid only remaining as a vertical diaphragm extending across the anterior segment of the globe.

But, if the changes be less acute, the remains of the vitreous show some tendency to organization, and form a yellowish translucent well-defined semi-globular mass adhering to the lens-capsule and ciliary body.

The choroid, though thickened and congested, is to the naked eye otherwise unaffected; no purulent exudation is seen on either of its surfaces.

The sclerotic is thickened and succulent; there is much infiltration of albuminous substance into the episcleral tissue.

The iris is more or less inflamed and may be in some cases infiltrated with pus, in which case there is also pus in the anterior chamber.

The microscope shows the central opaque part of the vitreous to be made up of large closely-packed bodies, between which is, in some cases, a scanty, structureless, or finely granular matrix. These bodies almost exactly resemble vitreous cells in their size* (diam = ·024 mm.), in the shape and lateral position of their nucleus (diam = ·0085 mm.). They are fainter, however, in outline, their nucleus is large and fainter, and their protoplasm less clear. They are also infinitely more numerous.

Intermixed with them are some (perhaps 2 per cent.) small cells (diam ·009 mm.), each containing several deeply staining nuclei clustered together. Transitional forms connect these two varieties with each other. A very few solitary rounded or angular moderately staining nuclei with little or no surrounding protoplasm can also be made out.

The translucent peripheral stratum lying on the ciliary body consists of a loose reticulum, the irregular fibrillation of which is clearly due to the coagulation of some albuminous substance in the meshes of which cells similar to those described above are found.

Here the smaller multi-nucleated cells are more distinctly seen and are at least twice as numerous in a given area as in the vitreous centre. The larger cells, though occasionally equal to them numerically, are sometimes scarcely recognisable. A few cells like them, but caudate, may be found also.

The purulent appearance of the internal aspect of the

* All measurements are taken after hardening in Müller's fluid and alcohol.

ciliary body is due to cells just like the smaller multi-nucleated ones already described, distributed sparsely in the sub-hyaloid space but abundantly between the much hypertrophied columnar elements of the pars ciliaris retinæ and also among the somewhat scattered granules of its pigment epithelium. The semi-transparent posterior part of the vitreous is in structure similar to the translucent zone. The opacities in connection with the papilla and in relation with the retinal blood-vessels are due to cells exactly like those found in the more central parts of the vitreous, though on the average they are a little smaller and more definite as to their outline and nucleus.

In those cases where the shrinking vitreous tends rather to partial organization than to entire conversion into semi-fluid pus, blood-vessels enter it from the ciliary body.

Spindle-shaped cells radiating from the ciliary body towards its centre are seen intermixed with the other elements of the vitreous already described. A few newly formed blood-vessels are seen entering it from the ciliary body which are often densely packed with multi-nucleated white blood-corpuscles.*

The ciliary body itself, though containing an excess of elongated nuclei both on and to a less degree between its muscular fibres, is usually free from multi-nucleated cells. In some, however, a very few are present, but they are not distributed more abundantly in the neighbourhood of the basement membrane limiting the pars ciliaris retinæ but rather the contrary, nor have they any special relation to its blood-vessels. Indeed, though found so freely in the adjacent pigment layer and pars ciliaris generally, they cease abruptly at the basement membrane separating it from the connective tissue of the ciliary body proper. And the staining bodies found in the blood-vessels are restricted to their

* Most of the white blood-corpuscles seen in preparations of healthy human eyes, equally fresh and similarly prepared, have also multiple nuclei. It is fair, however, to state that nearly all of these eyes were slightly congested, having been excised on account of tumours in their immediate vicinity.

lumen, and are clearly distinguishable both by their shape and the multiple character of their nuclei from the elongated nuclear bodies of their walls and of the connective tissue around them.

The iris contains an excess of nuclear bodies, elongated or rounded, some of the latter being multi-nucleated. A reticulum which contains a few multi-nucleated cells constituting a hypopyon, is sometimes found in front of the iris. The *choroid* contains an excess of elongated nuclei and, in rare cases, a few multi-nucleated cells. A few of these latter are also (very rarely) visible in the inner layers of the retina. The walls of the retinal blood-vessels are much thickened with excess of elongated nuclei. The optic nerve generally and the blood-vessels of the papilla are in a similar condition.

The sclerotic contains an excess of nuclei.

The corneal corpuscles are enlarged and disposed at various angles. At a later stage they are distinctly constricted or beaded as if dividing. No other corpuscular elements are visible, most certainly none like the multi-nucleated colourless corpuscles within the blood-vessels. The blood-vessels of the eye generally contain a varying excess of colourless blood-corpuscles which are approximately the same size as the multi-nucleated bodies already described as existing in the pars ciliaris retinæ, and like them contain 2, 3, or 4 nuclei aggregated in a cluster. In one case (No. 246) the newly-formed fine blood-vessels in relation to the *shrinking* vitreous are closely packed with them.

The thickened arterial walls contain an excess of elongated nuclei showing no evidences of division. Similar bodies are abundantly found in the connective tissue immediately surrounding them.

The large cells found in the suppurating vitreous are so exactly like normal vitreous corpuscles in size and shape that it is impossible to resist the conclusion that they are derivatives of them by enormous cell multiplication.

There is room for some difference of opinion as to the

origin of the smaller cells. Their multiple deeply-staining nuclei and the forms transitional between them and the larger cells, might indicate that they are these in a state of rapid multiplication. But, on the other hand, their resemblance to the cells found in the pars ciliaris retinæ and to those within the blood-vessels, might suggest that they are importations either from the blood-vessels or from the pigment epithelium layer of the pars ciliaris retinæ.

In favour of the latter is their abrupt limitation to the inner side of its basement membrane and the fact that although diminishing suddenly at the hyaloid, similar cells can be traced as far as the vitreous centre.

With regard to the question of their origin from the colourless corpuscles of the blood, their shape and size would rather favour it, though their peripheral unstaining zone is firmer and more abundant. Against it is their distribution, that is, they are not found more abundantly in the connective tissue immediately outside the capillaries than elsewhere. Indeed, in the majority of cases, their presence is exactly limited to within the lumen of the capillaries. Thus, in eyes which have undergone suppurative hyalitis, two forms of perverted nutrition may be observed. One in which there is an increase in the growth of the individual elements, as for example, the great elongation of the columnar elements of the pars ciliaris retinæ and of the Müllerian fibres of the adjacent retina (individual hypertrophy); another in which there is an increase of their number, as, for example, in the cells of the vitreous, in the nuclei of the muscular fibres and connective tissue of the ciliary body and of the arterial walls, and in certain cells of the pigment-bearing epithelium layer of the pars ciliaris retinæ* (numerical hypertrophy). It appears to us that the colourless corpuscles of the blood

* The loculi formed by its basement membrane contains spheroidal masses of cells, the outermost being pigmented; the more central are those which undergo proliferation. The resulting cells make their escape by rupture of the internal wall of the loculus and then lie among the columnar elements of the pars ciliaris retinæ.

partake of this last mode of increased nutrition while in the blood-vessels in the neighbourhood of the suppuration, and such a view might explain the leukhæmic condition of a person the subject of extensive or prolonged suppuration.

From the above facts we deduce the general conclusion that the migration of the colourless blood-corpuscles bears no part in these cases of suppuration of the vitreous body.

They are thus clearly marked off in their pathology from metastatic suppurations of the eye-ball, where the vitreous cavity has become full of pus from a migration of colourless corpuscles from the blood-vessels.

ON THE RELATION OF TUMOURS OF THE EYE TO INTRA-OCULAR TENSION.

By W. A. Brailey, M.D., Curator of the Museum.

It has long been a matter of observation that intra-ocular tumours, whether of retina or of choroid, may be a cause of increased tension, though many points of relation between the two conditions are not known or defined.

This paper seeks to show from the evidence of the cases recited in the preceding Report:—

1. That with intra-ocular tumours a stage of very slightly diminished tension precedes the glaucoma; this last being ultimately in its turn followed by a very considerable softening of the eye.

2. That in cases of tumour implicating solely the exterior of the eye, or even the optic nerve sheath alone, glaucoma may be developed as a consequence, though there is no preliminary stage of slightly diminished tension.

3. That the pathological changes accompanying increased tension, whether from intra- or extra-ocular tumours, are those typical of true primary glaucoma.

4. That in every case of tumour, whether intra-ocular of the retina or choroid, or extra-ocular of the conjunctiva, sub-conjunctival tissues, optic nerve, or orbital walls, with normal or even slightly diminished tension, these changes can be observed in process of development.

5. That the course of the pathological changes in a glaucoma may be inferred by a comparison of those observed in cases of tumours in the different stages of tension above referred to.

1. The first point is established by a reference to the cases of sarcoma of the uveal tract, cited in the Curator's Report (Nos. 580, 293, 313, page 232, *et infra.*), and by two similar cases which have very recently occurred at Moorfields.

The diminished tension is so uniform in its presence and degree, that we are warranted in supposing it to be of universal occurrence.

The pathological changes of this stage will be described subsequently. They consist, however, in brief, of a very slight inflammation of the ciliary body and iris, a slight neuritis, generally some little enlargement of the ciliary folds, with a corresponding slight advance of the iris-periphery as a result.

The cause of the diminished tension is, as far as I am concerned, a matter of speculation; perhaps the vitreous shrinks more rapidly than the tumour grows, or its more gradual atrophy may disturb the balance of fluids in the eye by diminished osmosis from the blood-vessels; or, perhaps with more probability, the loss of secreting uveal surface due to its invasion by the tumour may produce an effect greater than any slightly increased secretion in connexion with the inflammation observed at this stage can account for.

I have been able to draw no evidence in support of this, my first point, from retinal glioma, perhaps because, in this disease, the friends of the patient rarely suspect anything wrong previous to the establishment of the tension.

2. With regard to the *second* point, glaucoma is of much more rare occurrence with extra-ocular tumours.

This may be because the tumour is separated by the thickness of the sclerotic from the tissues most implicated in the glaucomatous changes. But perhaps the cause may rather be that these tumours are earlier observed and sooner operated upon.

In one case, however (No. 570, page 230), there was an increase of tension, and it is interesting to note that, though it must have been of extremely short duration, the pathological changes are markedly those found in primary glaucoma.

The cases of extra-ocular tumour have at their earliest stage always normal and never diminished tension.

3. In the case of extra-ocular tumour just referred to as

accompanied by glaucoma, the ciliary body was inflamed and atrophied; the iris was inflamed and its extreme periphery was applied to the cornea. The optic nerve was inflamed and the papilla swollen. The arteries of the ciliary body were dilated and the ciliary folds were a little enlarged.

And in the glaucoma caused by an intra-ocular sarcoma the changes are much the same.

There is, however, in these cases more evidence of inflammation, both in the adhesion of the ciliary folds to the peripheral part of the lens capsule, and in the presence of posterior synechiæ, than is usually the case in primary glaucoma. Organized fibrinous layers on the inner surface of the ciliary body are also more common in tumours. The adhesion to the lens would seem to show that the ciliary folds have been somewhat swollen. The arteries of the ciliary body are enlarged, though in rare cases where the ciliary region is staphylomatous, as, for example, in No. 419, they are not recognizable. Under similar circumstances they may not be noticeable in cases of primary glaucoma.

The optic nerve is much inflamed if the disease has been of short duration; but if it has existed longer, there is great connective-tissue increase of its trabeculæ, especially round the blood-vessels, which are numerous and large. The existence of these changes in the nerve is quite independent of the size or position of the tumour. The changes are greater as the tumour becomes larger. The swelling of the papilla seems always to exist at an early stage of the glaucoma, though it is often but slight. It results in atrophy. I have reason to believe that primary glaucoma is similarly always preceded by hazy and slightly swollen papilla.

In the glaucoma consequent upon retinal glioma the same changes are developed. There is, however, no inflammatory adhesion of the ciliary folds to the lens-capsule, but, on the contrary, the two structures are often separated by a broad stratum of glioma cells. This may perhaps be because the lens is more spherical at the time of life when glioma is more apt to occur.

The optic nerve, though its nerve fibres may be entirely replaced by glioma cells, has its fibrous trabeculæ, as well as its inner and outer sheaths very strongly hypertrophied.

Thus both intra- and extra-ocular tumours are accompanied by the pathological changes characteristic of glaucoma, though, as would be expected, they are most pronounced in the first class of cases.

4. Evidence that these changes are in existence before the tension becomes increased may be found by consulting the cases in the Curator's Report (Nos. 313, 388, etc.). It is difficult to say precisely why there should be inflammation, and still more difficult to say why more distant parts should share in it, for example, the ciliary body in tumour of the optic nerve sheath (No. 570), and conversely why there should be neuritis in tumour of the choroid, or of the external ciliary region (Nos. 548, etc.). It is even more inexplicable why the more remote structure should be sometimes the most inflamed. (No. 548.)

5. Clearly, if these tumours result in tension, and if their pathological conditions are the same as those found in glaucoma, their earliest pathological state is that of the pre-tension stage of glaucoma.

I have previously indicated elsewhere that, in my opinion, such a stage exists, and, among others, such clinical phenomena as failing accommodation, obscurations, enlarged ciliary vessels, and, I believe in every case, haze of the optic disc indicative of optic neuritis point in this direction.

The course of a primary glaucoma would then be, inflammation of ciliary body with enlargement of its arteries and a less degree of inflammation of the iris; enlargement of the ciliary folds with a corresponding advance of the peripheral part of the iris, and shallowing of the anterior chamber. In addition there is optic neuritis with a slight haze and swelling of the papilla.

All these changes are at first extremely slight, but afterwards they increase. The somewhat advanced periphery of the iris is carried forward against the cornea; it becomes

adherent there and finally atrophies. The ciliary folds may become adherent to the lens capsule. The ligamentum pectinatum, at first slightly inflamed, afterwards shrinks up and draws to a point the origin of the radial fibres of the ciliary muscle.

Shrinking, with connective tissue growth, takes place in the ciliary body generally, and its muscular fibres become especially atrophied. The ciliary folds participate in this atrophy, and the space around the lens-margin becomes much more widely opened than normally. They are always widely removed from the iris, from which it might be inferred that, though undoubtedly instrumental in first advancing it, they have not remained long in contact with it. Similar changes occur in the optic nerve. There is a shrinking of its bulk from atrophy of its nerve fibres, and a vast increase in its connective-tissue trabeculæ. These contain blood-vessels beyond the normal both in number and in size. When, however, the nerve is much contracted and hardened, the blood-vessels are less conspicuous.

The sclerotic, at first slightly inflamed and softened, becomes at last somewhat more rigid than normal.

It is worth noting that connective tissue growth is much less pronounced as a stage in the glaucoma secondary to tumours than in primary glaucoma, perhaps because the average age of patients who are subjects of the disease is less. But still an imperfect connective tissue is developed abundantly in the optic nerve in many cases of glioma.

In the cases of tumour where the tension has finally fallen below the normal, the inflammatory have given place to atrophic changes. The arterial enlargement is not found. The pigment epithelial layer on the internal surface of the ciliary body is atrophied, and its pigment granules are scattered.

In connexion with the preceding remarks, certain questions suggest themselves.

A. How does the presence of a tumour produce inflammation, especially that of the ciliary body and the optic nerve ?

An increase of nuclei is always found in the tissues bordering on a tumour, for example, with epithelioma of the conjunctiva (No. 56) it exists in the loose sub-conjunctival tissue. And sarcoma of the optic nerve-sheath produces inflammation and connective tissue growth in the nerve. Choroidal sarcoma may be a cause of iritis and resulting posterior synechiæ. And glioma of the retina produces similar changes. These inflammatory conditions are not due to commencing tumour extension, but rather to the physical influence of the tumour, for a cyst pressing upon the optic nerve produces precisely similar changes.

B. Supposing that a tumour can inflame the tissues immediately in relation with it, how is it that the inflammation travels to more distant parts, for example, from an internal or external tumour of the ciliary region to the optic nerve, or from tumour of the optic nerve-sheath (No. 570) to the ciliary body, or from the retina to the optic nerve and ciliary body?

Microscopical examinations show clearly that neither the vitreous body nor the retina is the carrier of inflammation, but that the fibrous and vascular tissues of the eye are the parts concerned in it. Thus in (No. 570) inflammation can be clearly traced forwards along the episcleral web and to a less degree along the choroid. More commonly, however, the last appears to take no share in it.

A similar condition of things occurs with wounds or ulcers of the cornea. The optic neuritis that is universally found under these circumstances appears to have been transmitted backwards from the cornea by way of the sclera and episcleral tissue.

C. How do the inflammatory and vascular changes described above stand in relation to the tension?

We must imagine that a hyper-secretion due to the inflammation of the ciliary body can produce the tension, though the earliest stages of inflammation co-exist with a tension even below the normal. It is, of course, impossible that atrophic changes can of themselves produce increase of fluid. It is

important to remark the frequency of arterial enlargement in the ciliary body.

D. Are there any other physical causes in action to which we can attribute the increase of tension ?

Undoubtedly the application of the peripheral part of the iris to the cornea is a strong factor in preventing the escape of fluids from the eye. And it exists in every case of glaucoma secondary to tumour contained in the previous Report.

There is no evidence in any of the cases of any obstruction to the passage of fluids round the lens-margin as a cause of the glaucoma. Indeed, in the cases where the ciliary body is vastly thickened by the tumour (Nos. 375 and 313) the tension is actually below the normal.

E. What is the cause of the advance of the peripheral part of the iris ?

In choroidal tumours some advance is due undoubtedly to the enlargement of the ciliary folds, which are extended equally in all directions. But only one case (No. 121) gives evidence that they have actually pushed the iris against the cornea. Indeed, it is the rarest thing in the world for the iris periphery to adhere to the ciliary folds, as it would probably have done had the two remained long or been forcibly in contact, whereas adhesion of the lens-capsule to ciliary folds is not uncommon.

It seems that an advance due, in the first place, to the ciliary folds, has been made complete and permanent by pressure of fluid, accumulated from obstruction to its exit from the eye in its passage along the shallow anterior chamber in its course to Schlemm's canal.

Though the ligamentum pectinatum becomes much contracted, it is clear that in eye-tumours this change does not occur early enough to retard by its effect upon the iris the exit of fluids from the eye.

In retinal glioma the ciliary folds are often clearly seen advanced to the iris. This, however, appears to depend in many cases upon the actual filling of the vitreous chamber by the tumour.

ON THE NATURE AND COURSE OF THE GLAUCOMATOUS PROCESS.

By W. A. Brailey, M.D.

A sufficient number of eyes at various stages of glaucoma have now been examined to warrant us in speakign on this disease with precision.

It is certain that inflammation of the ciliary body, iris, and optic nerve is always present, and that it is one of the earliest symptoms of primary glaucoma, being developed previous to the tension. It is usually most pronounced in the ciliary body, especially in and around its muscular fibres.

The iris periphery is nearly always applied to the cornea, and its advanced position is caused in the first instance by an enlargement of the ciliary folds due to their vascular turgescence, but afterwards its application is rendered more close and more extensive by the pressure of fluid behind it. Coincidently with the enlargement of the ciliary folds the arteries of the ciliary body become dilated.

Very shortly the ciliary body becomes altered in shape by the stretching of its muscular fibres in a meridional direction: this and their atrophy render its thickness somewhat less. Its arteries remain dilated though the ciliary folds are emptied of blood, and small. These and the antero-internal part of the ciliary body and ciliary muscle recede backwards so as to be widely removed from the iris periphery.

Subsequently there arises very rapid atrophy of the ciliary muscle fibres with very commonly dense connective tissue formation between them and in the optic nerve.

The choroid is compressed and atrophic. It rarely presents any traces of inflammation. The lens has not exceeded the normal diameter in any one of the specimens examined, and in most it has been considerably flattened in an antero-posterior direction.* It has been advanced but very rarely: the posterior chamber of the aqueous is usually of great depth.

* *See*, however, Vol. x, Part I, p. 131, Fig. 16.

If we ask for the causes of the increased intra-ocular fluid we must attribute it in the first instance to an inflammatory hyper-secretion of fluid from the ciliary body and iris. But when the iris has once become applied to the cornea another cause is established in an obstructed outflow of fluid from the globe through Schlemm's canal. When atrophic changes have supervened in the ciliary body and iris, this occlusion of the entrance to Schlemm's canal remains as the sole agent in keeping up the tension. Iridectomy cures by removing the periphery of the iris, and is effective provided that the inflammation is not in an acute stage.

But in glaucoma of long standing the atrophied iris is so firmly adherent to the cornea that its removal by iridectomy cannot be effected.

In such cases as well as in others sclerotomy may cure by making a new access to Schlemm's canal.

"Hyposcleral Cyclotomy" may cure in a similar manner, but it will be less effective than sclerotomy, as it makes a new access at one point only.

The glaucomatous inflammation is characterized for the most part by an absence at any stage of any thickening of the ciliary body and iris, and by the lack of fibrinous exudations on them. As compared with other forms of inflammation, it shows only a moderate increase of nuclei in the parts it involves. In some cases there is evidence that the arterial dilatation is secondary to an obstruction in the circulation caused by increased intra-ocular pressure. But it remains remarkable that this enlargement is not seen in the increased tension accompanying serous inflammations of the uveal tract.

The changes which are found to occur in Primary Glaucoma are in nearly all respects the same as those inferred from the preceding study of the increase of tension accompanying Tumours.

ON THE MEANING OF THE WORDS "NYCTALOPIA" AND "HEMERALOPIA:" WITH A CRITICAL EXAMINATION OF THE USE OF THESE WORDS IN THE ANCIENT GREEK AND LATIN AUTHORS.

By W. A. Greenhill, M.D., Oxon.

[Notwithstanding what may be almost called a general consensus of opinion among modern writers regarding the meanings of the words nyctalopia and hemeralopia, I have from my first examination of the subject, some nine or ten years ago, thought that, according to the authority of the best classical writers, and according to the etymological construction of the word, the real meaning of the term nyctalopia is *night-blindness*, and not *night-sight* as the moderns assert; and consequently, that the meaning of the opposite term hemeralopia is *day-blindness*, and not *night-blindness*. A further special investigation two years ago confirmed me in this opinion. Failing, however, to obtain the acquiescence of those of my friends who were acknowledged authorities in all matters relating to classical learning, I determined to submit the question to Dr. Greenhill, who has given much attention to ancient medical nomenclature. Accordingly, about fifteen months ago, without stating the conclusion to which I had come, I asked Dr. Greenhill to be so good as to favour me with his opinion on the true classical meaning of the word nyctalopia: and was not a little gratified to find that he had, from a more complete and critical examination of the authorities than I could pretend to have made, come to the same conclusion as that at which I had arrived. Dr. Greenhill has kindly furnished me with an elaborate statement of his views in a letter which, with his permission, I have much pleasure in publishing. The Editor.]

Dear Sir,—I quite agree with you in thinking it most desirable to endeavour to fix the meaning of the words "Nyctalopia" and "Hemeralopia;" and, as you ask for my opinion on the matter, I will give it in some detail, and will state the reasons for thinking that it will be better for the future to use the word

"Nyctalopia" in the sense of night-*blindness*, rather than night-*sight*.

When a person invents a new name, whether it is formed with etymological accuracy or not, he has a right to fix to a certain extent its meaning, which all who make use of his word will refrain from altering without some sort of necessity. But in the case of "Nyctalopia" and "Hemeralopia" we do not know who invented the words, nor what they were originally intended to signify, except that evidently one was meant to be the opposite of the other.

In most cases, however, (except in some of the barbarous and unintelligible terms of the present day,) the meaning of a compound-name is indicated with sufficient clearness by its etymology. But here, again, we are at fault in the case of the terms in question, for (in the opinion of the best etymologists) the force of the different syllables and *letters* of which the words are composed is by no means incontestably ascertained.

Perhaps, therefore, upon the whole it is safest to try to ascertain in what sense the words were used by the earliest Greek and Latin writers, even though there is not an absolute *consensus* of authorities, and one Greek glossographer candidly gives *both* meanings.[1] Nevertheless, it will appear that the preponderance of the ancient authorities is decidedly in favour of the meaning given above, and this is probably the strongest reason for adopting it.

Before beginning to examine these ancient writers, it may be well to state that the following remarks will apply exclusively to "*Nyctalopia*," the corresponding word "*Hemeralopia*" being probably found only *once* in any ancient Greek or Latin writer, and it being impossible to decide the sense in which it is used in that passage.[2]

In conducting such an inquiry, the first step would naturally be to find out the meaning given to the word by Hippocrates, Aristotle, and Galen, and their usage of the term might almost be considered as final and conclusive. The case of Hippocrates

[1] The author of the spurious work called "Introductio, seu Medicus," cap. 16, in Galen's works, tom. xiv, p. 776, l. 9.

[2] Pseudo-Gal., "Introd.," p. 768, l. 8. The word has escaped the notice of the Paris Editors of H. Stephani "Thes. Græc.," and also of Liddell and Scott.

must be especially noticed presently, and Aristotle does not define the word;[1] but Galen says distinctly that it was intended to signify night-blindness,[2] and that this is the sense in which it is used in the Hippocratic Collection:[3]—it is probable also (though it cannot be positively proved) that this is the meaning which he gives to the word himself.[4]

The evidence of Pliny is valuable, as showing that the word was not in his time thoroughly naturalized among the Romans, but was only beginning to be used;[5] while Celsus, who lived somewhat earlier in the same century, mentions the disease, but without giving it any name.[6] How then can Celsus be quoted as an authority for the meaning of a word which he does not use? The answer is perfectly satisfactory; it is because he is almost certainly referring to a passage in the Hippocratic Collection, which will be mentioned presently; and if your oppo-

[1] "De Gener. Animal.," v. 1, § 28, p. 146, ll. 15, 19, ed. Bekker.

[2] "De Meth. Med.," ii, 2, tom. x, p. 84, ll. 11, 13, 14.

[3] "Gloss. Hippocr.," tom. xix, p. 124.

[4] See "De Simplic. Medicam. Temper. ac Facult.," i, 1, § 11; "De Compos. Medicam. sec. Loc.," iv, 8, tom. xii, p. 336, l. 3; p. 802, l. 10. At first sight these passages would seem to prove nothing, as no explanation of the word is given; but the mention of "goat's liver" as a remedy for the disease, seems to point out that it is *night*-blindness that is intended. The explanation of this empirical mode of treatment is to be found in two passages of Pliny ("Hist. Nat.," viii, 76, p. 100, l. 9, ed. Tauchn; xxviii, 47, p. 192, l. 4 from bottom), in which he says that goats can see as well by night as by day, and that therefore their blood and liver are used in cases of *night*-blindness. Of course this argument is not logically conclusive, because we are not sure that goat's blood and liver may not have been given in cases of *day*-blindness also; but it seems to amount to a high degree of probability, and may be used (*valeat quantum valet*) until it is shown to be fallacious.

This same argument applies to Dioscorides, who says that goat's liver is useful in cases of *nyctalopia* (*i.e.*, *night*-blindness?) "De Mat. Med.," ii, 47, tom. i, p. 185, l. 7; ed. Spreng.

Two apparent exceptions to the statement in the text ("Introd.," cap. 16, and "Defin. Med.") will be noticed presently; and two other passages in the Galenic Collection *in accordance with* those here referred to, need not be added to the list, because the work in which they occur is (probably) spurious. ("De Remed. Parab.," i, 5; ii, 4, tom. xiv, pp. 350, 415.)

[5] In one passage ("Hist. Nat.," xxviii, 47), he speaks of "Nyctalopas *a Græcis dictos*;" in two others (viii, 76; xxxii, 24) he uses the name like an ordinary Latin term.

[6] "De Medic.," vi, 6, § 38.

nents are inclined to dispute this, you may fairly ask what other word they think Celsus had in his mind.

The succeeding writers who use "Nyctalopia" in the sense of *night*-blindness may be simply enumerated chronologically, viz.: Oribasius,[1] Palladius,[2] Aëtius[3] Alexander Trallianus,[4] Paulus Ægineta,[5] and Joannes Actuarius.[6] A few more authorities might be added, but you will be inclined to cry out, "Ohe, jam satis est."

It is indeed a goodly list, containing the names of all the most eminent physicians of antiquity, with *one* exception, viz., *Hippocrates;* and as long as your opponents are able to appeal to Hippocrates and Galen in favour of their interpretation of the word, there is no prospect of the discussion coming to a satisfactory termination. It is therefore necessary to examine the passages in these authors where the word occurs; and we will begin with Galen.

It has been already stated that in one of his works, which is undoubtedly genuine, Galen distinctly explains Nyctalopia to signify *night*-blindness, and it is almost incredible that so careful a writer should be found to use the word elsewhere in the opposite sense. The two passages alleged in support of this inconsistency are found in two works, which five-and-thirty years ago I stated (after Ackermann, Kühn, and Choulant) to be of doubtful genuineness.[7] I know of no reason for modifying the opinion which I then expressed, but should

[1] "Synops.," viii, 48; "Eupor. ad Eunap.," iv, 18, tome v, pp. 451, 709, ed. Daremberg.

[2] Dietz, "Schol. in Hippocr. et Gal.," tom. ii, p. 181, ll. 12, 18, 24. This passage is curious from the mention of *ἀλώπηξ, fox*, in connection with the disease, which perhaps accounts for the monstrous word *νυκταλώπηξ*, found in some editions of Aristotle (*loco cit.*), where Bekker properly reads *νυκτάλωψ*.

[3] VII, 46, p. 132, l. 50, ed. Ald.

[4] II, 6, p. 147, ed. Basil.

[5] III, 22, p. 35B. l. 23, ed. Ald. (See vol. i, pp. 420, 434, Adams's Transl.)

[6] "De Diagn.," ii, 7, p. 447, l. 32, in vol. ii of Ideler's "Phys. et Med. Græci Min."

[7] The "Introductio, seu Medicus," c. 16, tome xiv, p. 776, l. 9; and the "Definitiones Medicæ," c. 343, tom. xix, p. 435. See Smith's "Dict. of Gr. and Rom. Biography," vol. ii, pp. 216, 217.

rather be inclined to intensify it, and to argue that the fact of their contradicting in this point Galen's known opinion, is a plain proof of their spurious origin. Unless, therefore, your opponents are prepared to support the genuineness of these two works, they cannot appeal to the authority of Galen.

The case of Hippocrates requires more discussion, but the details shall be relegated to a *Note*, so that they need not be read by any one who does not care to enter upon a minute point of verbal criticism. The word occurs in *five* passages in the Hippocratic Collection, but of these only the third concerns us here, as the other four merely mention the term, without any indication of its meaning.[1] This passage requires very different treatment from those (supposed to be) quoted from Galen, which have just now been noticed; but the result will be equally satisfactory. In this case it is not sufficient to state that it comes from one of the spurious treatises, because its being found in any part of the Hippocratic Collection gives it a priority of several centuries in antiquity over the earliest passage quoted on our side. Indeed, until the year 1864, your opponents had a perfect right to appeal to the Hippocratic Collection, for up to that date the reading in every (?) edition was οἱ δὲ τῆς νυκτὸς ὁρῶντες, and Ermerins was the first editor, who, by introducing the word οὐχ before ὁρῶντες, completely altered the sense.[2] I believe myself that he was right in making this change,[3] and unless your opponents can show with some degree of probability that he was wrong, they must not appeal to Hippocrates for the future.

It seems almost ludicrous to mention in opposition to the authority of Oribasius, Aëtius, Alexander Trallianus, and Paulus

[1] "Epid.," iv, § 52; vi, 7, § 1, tome v, p. 192; p. 332, ll. 2, 3, 5, ed Littré. "Prorrhet.," ii, 33, 34; "De Visu," § 7, tome ix, pp. 64, 66, 158.

[2] As his edition is by no means convenient for use, it may save trouble if I mention that the passage will be found in vol. iii, p. 389.

[3] My reasons for this opinion are *four*, viz: 1, there is sufficient MS. authority for the reading; 2, it was probably so written in the MS. used by Celsus, and 3, also by Galen; and 4, *Nyctalopia* has not been found in the sense of *day*-blindness in any author so early (by many centuries) as the Hippocratic Collection. These four points (or at least the first three) require some explanation.—

1. The learned Greek, Coray, at the beginning of this century, pointed out the fact (which had before been noticed by Chamseru in the "Hist. de la Soc. Roy. de Méd.," 1786, Pt. ii, p. 141) that one of the MSS. in the great

Ægineta, such names as Theodorus Priscianus,[1] Leo,[2] &c.; so that the cause of your opponents, so far as it rests on classical authority, may be said to have broken down altogether.

But though the chief reason for wishing to restrict the signification of *Nyctalopia* to *night*-blindness is the use of the word in that sense by the old medical writers, you can also derive some little support from etymology,—at least, as much as your opponents. The derivation of words ending in ωψ is, I believe, very puzzling and uncertain; but here I would speak with great diffidence, as I am aware that I am getting *ultra*

Library at Paris (which has changed its name so many times since then) had originally the word οὐχ before ὁρῶντες, which had been erased, but was still quite visible. ("Notes sur le Traité des Airs," &c., p. 46.) This MS. (No. 2254) is of the 14th century, and is placed by M. Littré *fourth* in order of importance among the general MSS. of Hippocrates (tome i, p. 518; tome ii, p. 378), and *first* among those that contain the "Prorrhetica" (tome ix, p. 4). Nevertheless, M. Littré has not admitted this reading into his text, (1) because it is found in no other MS., and (2) because the ancient writers were not agreed as to the sense of *Nyctalopia*. But surely no one knows better than M. Littré himself that the reading of a number of inferior MSS. may be rejected in favour of a superior one; and, if he had examined the passages in which *Nyctalopia* is used by ancient writers, he would have found such a preponderance in favour of *night*-blindness as would have induced him to correct his text, and thus anticipate Ermerins (Hippocr. "Opera," vol. iii, p. 389).

2. Coray refers to Celsus (vi, 6, § 38), and points out that he must certainly have been translating this passage of the "Prorrhetica." If this be so, it shows us the state of the text at the beginning of the Christian era, twelve hundred years before the date of the earliest existing MS., and is a testimony of the very highest importance.

3. Scarcely less weighty is the fact that Galen, in the latter part of the second century, interpreted *Nyctalopia, as used in the Hippocratic Collection*, to signify *night*-blindness, which is quite a different thing from saying that he used the word in that sense himself. It amounts, therefore, to a moral certainty that Galen (if in those early times there was any diversity in the MSS. which he used) considered the true reading to be οὐχ ὁρῶντες.

4. I believe (but, of course, cannot prove) that *Nyctalopia* did not bear the sense of *day*-blindness when the "Prorrhetica" were written; and this belief may very fairly be held until some early instance of this use of the word is brought forward.

[1] I, 10, quoted by Forcellini (*Facciolati*).

[2] "Consp. Medic.," iii, 39, in Ermerins, "Anecd. Med. Gr.," p. 149.

crepidam. Without therefore noticing any of the other words with this termination[1] (many of which have nothing to do with ὤψ), we may be content in the cases of ἡμεράλωψ and νυκτάλωψ to accept Galen's etymology,—at least until any manifestly superior derivation has been brought forward. Of course his authority in matters of etymology is not very great, for etymology was not studied scientifically among the ancients; but we know, that, among all other subjects connected with his profession, he had given much attention to medical nomenclature,[2] and it is probable that he had taken some pains to ascertain what the word was really intended to mean. He explains νυκτάλωπες, *οἱ τῆς νυκτὸς ἀλαοί*,[3] *those who are blind* (ἀλαοί) *by night*, evidently supposing the word to be compounded of νύξ ἀλαός, and ὤψ, and thus accounting for the αλ in a simpler manner than any other of the etymologies which have been proposed,[4] and which need not be examined here.

It is quite unnecessary to mention the opinions of modern lexicographers in detail; some explain the words in one way, and some in the other, perhaps without any very decided preponderance on either side. There is, however, one great living authority, whose reasons for preferring the wrong (?) interpretation require to be examined in detail, on account of the great and deserved weight that belongs to every opinion (on such subjects) that he expresses. I confess I feel something like a parricide in thus "laying hands on my father Parmenides;"[5] but, if these pages should ever fall under his notice, I am sure he will excuse my thus disputing his opinion.[6] M. Littré has in *three* places explained *Nyctalopia* by *day*-blindness, viz., in his edition of Nysten's "Dict. de Médecine" (1855); in the Notes to

[1] Viz., ἀλαώψ, μύωψ, ὕδρωψ, μώλωψ, ἀγχίλωψ, αἰγίλωψ, αἱμαλώψ, θυμάλωψ.

[2] See "Meth. Med.," ii, 2, tom. x, p. 81, &c.

[3] "Gloss. Hippocr.," tom. xix, p. 124.

[4] Liddell and Scott derive the word from νὺξ and ὤψ only, ignoring the αλ altogether; but as they recognize the compounds ἀλαωπός, and ἀλαώψ, if we prefix νυκτ to these words, we have *very nearly* the word we want.

[5] See Jowett's Plato, Preface.

[6] [Since these words were written, the death of M. Littré has been announced; but the sentence may be left, as a slight token of respectful regret for the loss sustained by his friends and by the literary world. June, 1881.]

his Hippocrates (1861); and in his "Dict. de la Langue Française" (1878).

1. In his "Dict. de Méd." he says that "la lettre *l* est purement euphonique," and derives the word from *νύξ* and *ὄπτομαι*, noticing the derivation from *νύξ*, *ἀλαός*, and *ὤψ*, only to reject it: but as the etymology of the word has been noticed above, perhaps it is sufficient here to say that his derivation is not evidently superior to Galen's. He says that Hippocrates and Galen used the words *νυκτάλωψ* and *νυκταλωπία*[1] in the sense of *day*-blindness: but in the case of Hippocrates he should have stated that the reading of the passage to which he referred was doubtful; and in the case of Galen he should have said that the two treatises in which the word is used in this sense are at least of doubtful authenticity, while in one of Galen's genuine works the word is used in the sense of *night*-blindness.

2. His Note on Hippocrates (tome ix, p. 65) has been already considered.

3. In his "Dict. de la Langue Française" under *Héméralopie*, he quotes the Greek form *ἡμεραλωπία*, which (as has been said before) has not hitherto been found, and calls it "composition irregulière de *ἡμέρα jour*, et *ὤψ*, *ὠπός*, *œil*." He gives no special reason for preferring the meaning assigned to this word and to *Nyctalopie*, and seems to rely entirely on the etymology, which (it is submitted) cannot be considered sufficient to decide the question.

Under *Nyctalopie* he says, "La forme s'explique par une forme *νυκταλός*, qu'on trouve au sens de *dormeur*," and derives the word *νυκτάλωψ* from *νύξ* and *ὄπτεσθαι*, as in his "Dict. de Méd." But *νυκταλός* seems to be a suspicious word (see Liddell and Scott), and there is no corresponding word, *ἡμεραλός*, to appeal to in the case of *Héméralopie*: so that, upon the whole, while we may be quite inclined to agree with M. Littré in considering the composition of the two words to be anomalous, we may at the same time be willing to acquiesce (at least for the present) in an etymology with which Galen appears to have been satisfied.

This is what I had to say on the subject, but I must not

[1] This is not quite correct, for the form *νυκταλωπία* is not found in Greek; nor is *ἡμεραλωπία*, which M. Littré gives under *Héméralopie*.

end my letter without offering you a few words of encouragement, together with my reason for thinking it possible that you may be successful in your endeavour to put an end to the confusion which has existed for considerably more than a thousand years. Coray hoped "faire cesser une fois pour toutes cette confusion qui regne depuis le siècle de Galien," and he did his part in the work by reproducing M. Chamseru's correction of the passage in the "Prorrhetica." The emendation was not, however, brought sufficiently before the members of his profession, but was buried in the Notes to his edition of the "De Aëre, Aquis, et Locis;" neither was it adopted by the subsequent editors of the Hippocratic Collection. Now, however, that Ermerins has introduced it into his edition,[1] the case is altered, and you have the advantage of being able to refer your opponents to the printed text, where they will find the corrected reading. The other reason why Coray failed in his attempt was because (though he must have known it) he did not point out the worthlessness of the passages quoted from spurious Galenic treatises. Now that this has been done, thus knocking away the *second* mainstay of the building, you may perhaps without unreasonable presumption hope to see the whole edifice fall to the ground.

Yours truly,

W. A. GREENHILL, M.D., Oxon.

HASTINGS, *April* 23, 1881.

NOTE.—It is a curious coincidence (if nothing more) that the Latin terms *lusciosus*, *luscitiosus*, after being used by Varro[2] and Pliny[3] to signify *night*-blindness, were by later writers[4] used in the sense of *day*-blindness.

[1] 3 vols, 4to. Traj. ad Rhen., 1859–64. It is a great pity that Ermerins should have preferred typographical splendour to utility, and should have published both his Hippocrates and his Aretæus in such a cumbrous and expensive form as to prevent their ever coming into general use. At last, however, he was sensible of his mistake, and his Soranus is equally elegant, and far more convenient.

[2] Quoted in Forcellini (*Facciolati*).

[3] "Hist. Nat.," xxviii, 47, p. 192, l. 4 from bottom, ed. Tauchn.

[4] Pompeius Festus, *in voce*; Fulgentius, quoted in Forcellini (*Facciolati*). The passage in Plautus ("Mil. Glor.," ii, 3, 50) may perhaps be taken in either sense.

In this Letter the common Latin form *Nyctalopia* has been used, but there is probably no such word in Greek, and perhaps the earliest writer who uses it is Isidorus Hispalensis ("Orig." iv, 8, quoted by White and Riddle). The Greek forms are the following: νυκτάλωψ, meaning sometimes the *disease* itself (Hippocr. "Epid.," vi, 7, § 1, tome v, p. 332, ll. 2, 3, 5; Arist. "Gener. Anim.," v, 1, § 28, p. 146, ll. 14, 19), sometimes the *patient* (Hippocr. "Epid.," iv, § 52, tome v, p. 192, l. 4; Pliny, "Nat. Hist." xxviii, 47, p. 192, l. 4 from the bottom); νυκταλωπικός (Hippocr. "Epid.," vi, 7, § 1, tome v, p. 334, ll. 6, 8); νυκταλωπιάω (Gal. "De Comp. Medic. sec. Loc." iv, 8, tom. xii, p. 802, l. 12; Aëtius, vii, 2, p. 124, l. 16); νυκταλωπίασις Orib. ("Eupor.," iv. 18, tome v, p. 710, l. 2).